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Special Tools and Operations Used in Making Sweepers

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A few of the many devices and methods that have been designed to secure interchangeability and increase production in the plant of the Hoover Company

AIR clamping fixtures are used to a considerable extent in the plant of the Hoover Co., North Canton, Ohio, an example being shown in Fig. 1. The operation consists of facing the central opening in the drum or main castings, the two milling cutters shown being carried in a special head bolted to the face of the milling-machine column. The cutters are both driven from the milling-machine spindle gear.

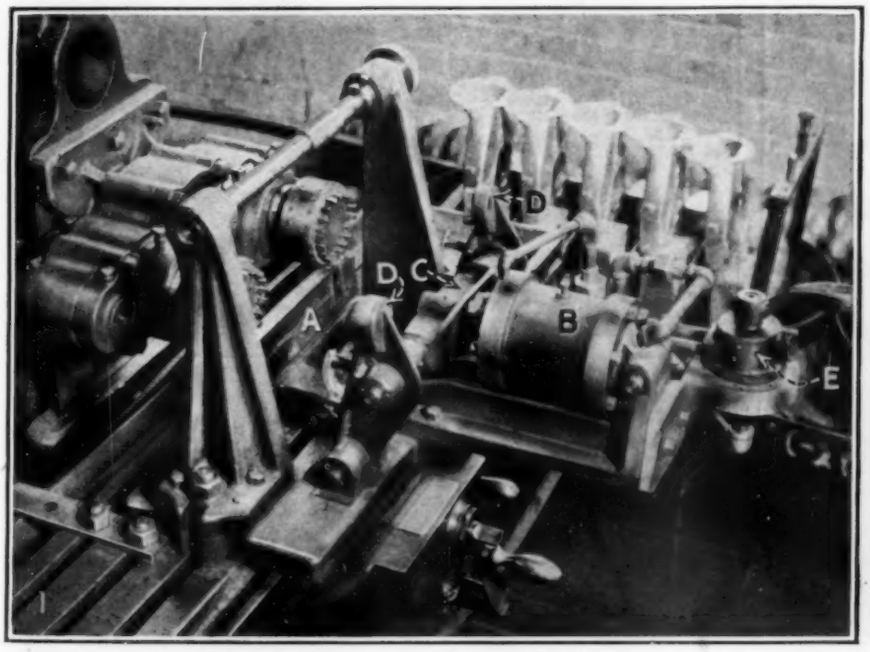
The fixture is attached to the milling-machine table and clamps the work against the block *A*. The air cylinder *B* actuates the cross bar *C* and forces the arms *D* against the back of the work. The air-control valve is at *E*. Using the two heads enables the pads on each side of the main housing to be finished in one-half the table travel than if but one cutter were used.

The type of multiple drilling-head used to a considerable extent, is shown in Fig. 2. It consists of four closely grouped spindles mounted in a compact head. One of the features is the guiding of the head by a pillar in much the same way as alignment is secured in pillar dies. The work is located on the base plate and the pillar guides the drills with reference to the base, making a guide plate with bushings unnecessary.

A somewhat different design, of drilling head in which two pillar guides are used, is shown in Fig. 3, in which the work is fed up to the drills by a cam-operated table.

Another special head is shown in Fig. 4, and is used for counterboring inside the drum. The counterbore is held at the end of the offset arm, being driven by gears from the drill spindle, these being all inclosed.

The revolving brush in a Hoover sweeper is an important feature and great care is taken to have it run truly and easily. On the large, hotel-type machine, the brush body is made of a sand casting instead of a die casting as on the standard machine and requires



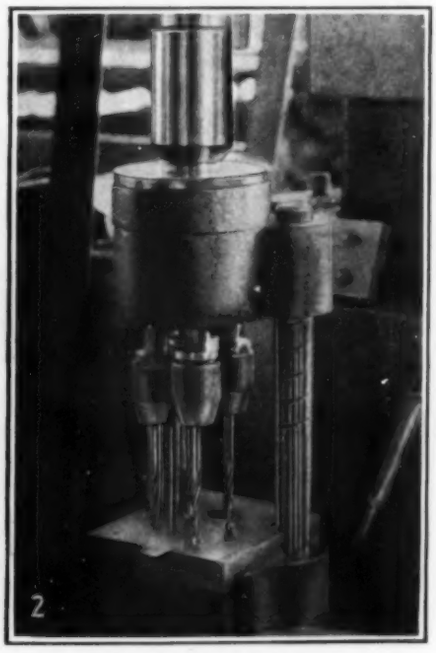


Fig. 1—Air-clamping fixture and double cutters. Fig. 2—Drilling head with pillar guide

special machining. In order to have the bearing at each end in line, the brush body is held in the fixture shown in Fig. 5. Here the brush body *A* is held at each end with jaws actuated by the floating clamp-lever *B*. The left end of the fixture is fastened to the spindle nose of the lathe. The trunnion on the right end runs in the special roller-rest at *C*, its construction being clearly shown. This rest supports the outer end of the brush body while it is being bored.

When the first end is finished the inner frame that carries the brush body is turned 180 deg. inside the outer frame, Fig. 6 showing the frame partly turned. The latch *D* and the pin above it show how the frame is indexed. This view also shows the construction a little better, including the second latch *E* at the left end of the fixture. Swinging the brush body 180 deg. allows both ends to be bored at the same setting, and with an accurate fixture, insures the ends lining up.

The brush guard has six steel wires staked into a square bar. In order to do the staking at one stroke and with as little effort as possible, the fixture shown in Fig. 7 has been devised. The six blocks each have a groove into which the wires are easily laid, and the roll carrying the six hollow plugs is turned to a horizontal position. All six wires are pushed into the holes in the plugs, and the roll is turned to a vertical position by means of the handle as in Fig. 8. The bent guard of square steel is then placed in position and a single stroke of the press used, forces all six wires into place. The pin *A* stops the handle in the proper position for loading and so avoids all delay from lack of alignment. The roll rests on a substantial support that takes the force of the pressure and so obviates spring, or undue pressure on the end bearings. This makes a very rigid fixture.

A turret fixture by which the ends of the piece, known as the converter, are turned or, more properly, hollow milled, is illustrated in Fig. 9. This fixture is

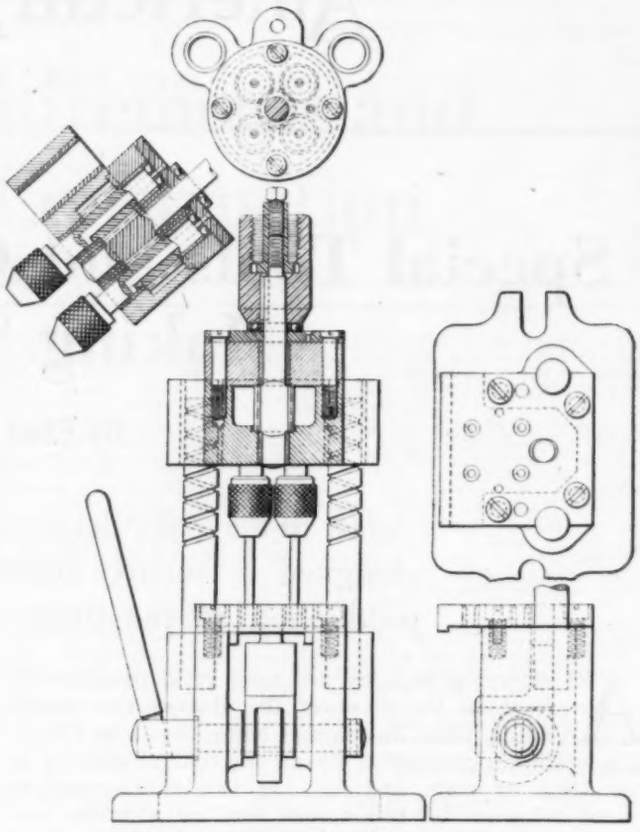
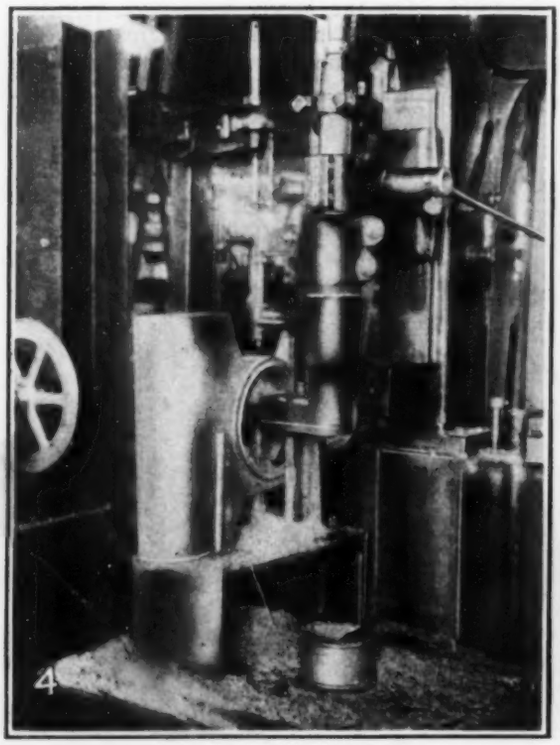
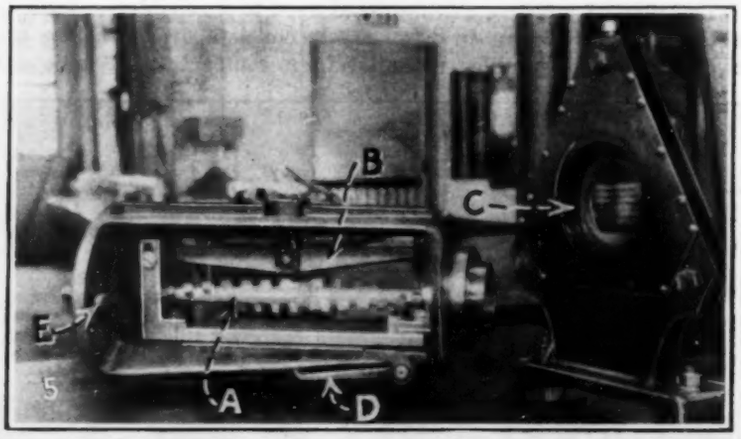


Fig. 3—Details of a drilling fixture

typical of a number that have been designed for use on vertical drilling machines. Four pieces are held at once, giving a chance for loading and unloading without stopping the work. The pieces are clamped against a flat surface and positioned by locating points. The single clamp *A* is actuated by a cam on the lever *B*.





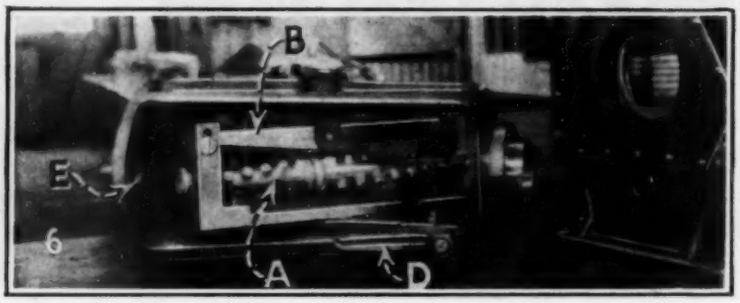
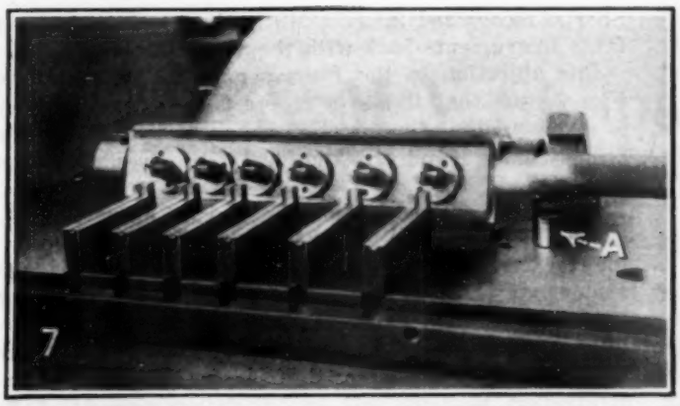
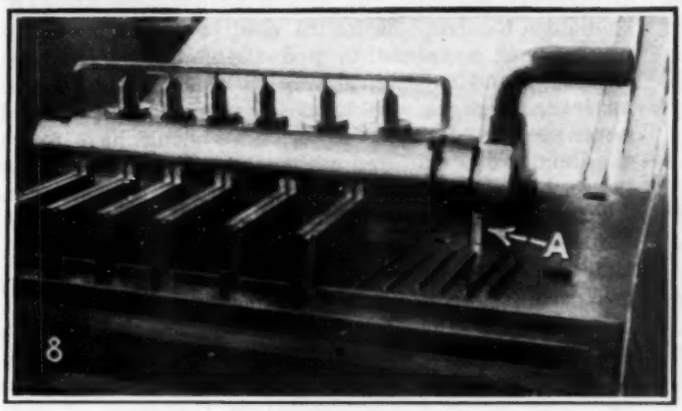


Fig. 4—Offset counterboring-head. Fig. 5—Fixture for boring brush body. Fig. 6—Brush body partly indexed





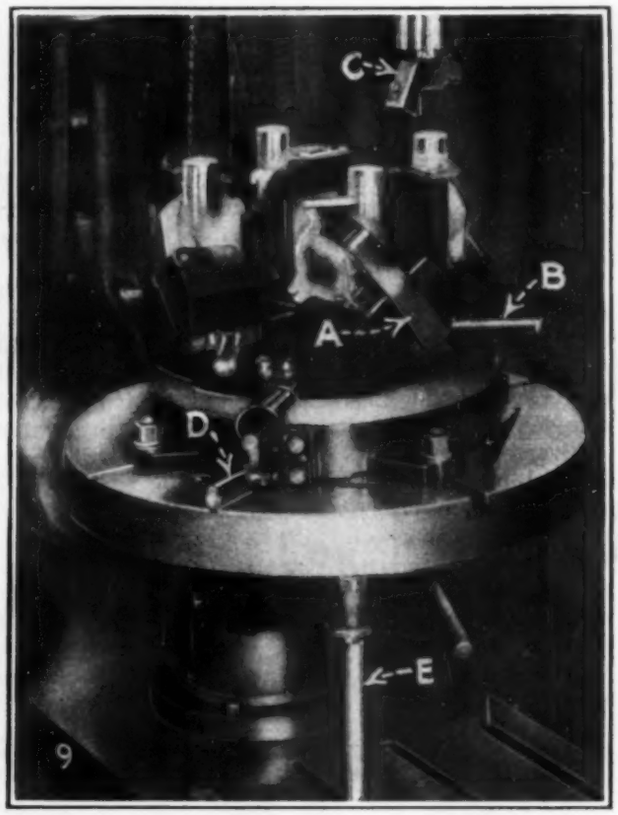
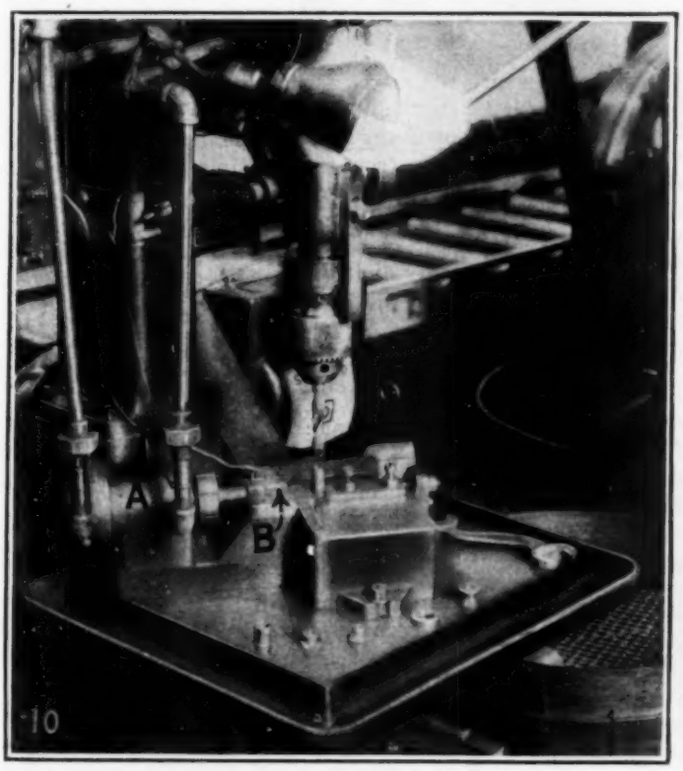


Fig. 7—Riveting fixture—loaded. Fig. 8—In position to rivet. Fig. 9—Hollow milling on drilling machine

The hollow mill is very simple, as can be seen at *C*. The indexing latch is shown at *D*. A support *E*, under the table, takes care of spring.

Another air-operated fixture is shown in Fig. 10 where studs are chamfered at the ends to remove burrs. The air cylinder *A* controls the jaw *B* that holds the piece to be chamfered against a stationary jaw behind.

One of the riveting machines used is shown in Fig. 11. It is an air-operated riveting hammer and, as shown, is ready to rivet the head and shank, or stem, on the caster-adjusting knob that is now made in two parts. It has been found more economical to make the head and stem separately than to turn off the difference in diameter between the head and the body.



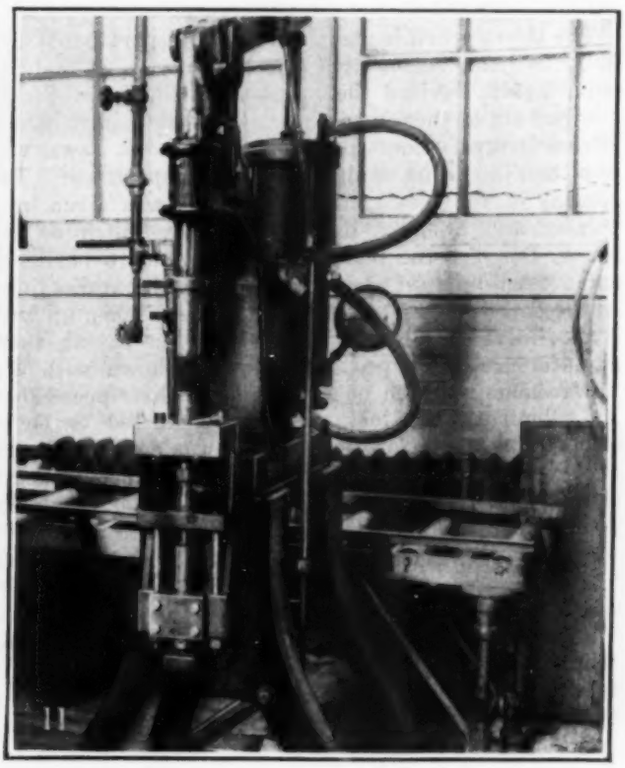


Fig. 10—Another air-operated fixture. Fig. 11—Air hammer for riveting parts.

When Every Man's Gage Set a Different Standard

WHAT more can any of us ask for than to live through the history-making period of some of the world's greatest industries? To have a part in the development of the radio, the automobile, the motion picture, the telephone, the typewriter; to do one's share in adding to the rich result of American genius?

Most of these products were unthought of during the boyhood of many men now living. It is hard to realize the handicaps the workman of fifty years ago had to confront. Take the matter of such an indispensable tool, for instance, as the micrometer. An episode brought out in connection with the sixtieth anniversary being celebrated this year by the Bridgeport Brass Co. will illustrate the point. According to Prof. Joseph W. Roe, in his book, "English and American Tool Builders," in 1887, the Bridgeport Brass Co. had a lot of sheet brass returned to it from the Union Metallic Cartridge Co. as "out of gage." Investigation showed that the sheets were to the gage of the manufacturer, but that the gage used by the customer did not agree, and, further, when both gages were tested by a third, no two of them agreed. All three gages were supposed to be the regular U. S. Standard, adopted by the wire manufacturers in 1857, of the well-known round, flat form, with slits for the various sizes cut in the circumference.

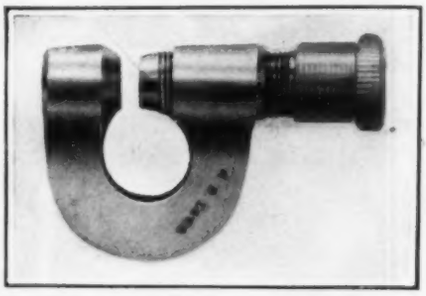


Fig. 1—The Laws gage

The then superintendent of the Bridgeport Brass Co., S. R. Wilmot, seeing that the difficulty was likely to occur again, devised the micrometer shown in Fig. 1 and had six of them made by a skilled machinist named Hiram Driggs, under the direction of A. D. Laws, who was then in charge of the mechanical department. The reading of the thousandths of an inch was given by a pointer and a spiral line of the same pitch as the screw, forty to the inch, running around the cylinder and crossed by a set of twenty-five lateral, parallel lines. In the early part of 1867, the matter was taken up with J. R. Brown & Sharpe with a view to having them manufacture the gages, and the one shown with Mr. Laws' name stamped on it, is still in their possession. As submitted, the tool was not considered to be of commercial value, for the cylinder was completely covered with spiral and straight lines intersecting each other so closely that it was impossible to put any figures upon it, thus making it very difficult to read.

Quite independently of the development of the "Laws" micrometer it happened that later in the same year (1867) Joseph R. Brown and Lucian Sharpe visited the Paris Exposition and were impressed with a "screw caliper" which had been invented some nineteen years previously by a Frenchman named Jean Laurent Palmer. No general appreciation of the importance of this tool seems to have existed until Messrs. Brown and Sharpe recognized its possibilities and brought one of these instruments back with them to America.

One objection to the Palmer micrometer, shown in Fig. 2, was that it had a coarse thread, reading only as fine as tenths of millimeters (about 0.004 in.). While crudely made it did give the idea of the present system of division.

In a letter written in 1887 by Lucian Sharpe to F. A. Strong of Bridgeport, Conn., Mr. Sharpe, after recounting the circumstances relating to both the Laws and Palmer gages, said: "As to whom the credit is due for producing the 'Pocket Sheet Metal Gage,' you can determine from the above statement of facts. We never should have made such a gage as was shown us by the Bridgeport man in 1867 to sell on our account, as it would be too troublesome to read to be valuable. If we had not happened to find the Palmer gage, and thereby found a practical way to read thousandths of an inch, no gages would have been made. If we had never seen the Bridgeport device we should have found the Palmer at Paris, and without doubt have made such gages, but possibly would have made a larger one first. The immediate reason for making the 'Pocket Sheet Metal Gage' was the suggestion coming from the Bridgeport Brass Co. of the want of a gage of the size of the sample for the use of the brass trade."

Accordingly the Palmer plan of division and the Bridgeport size and general form of gage with the addition of a clamp for tightening the screw and the adjusting screw for compensating the wear of ends

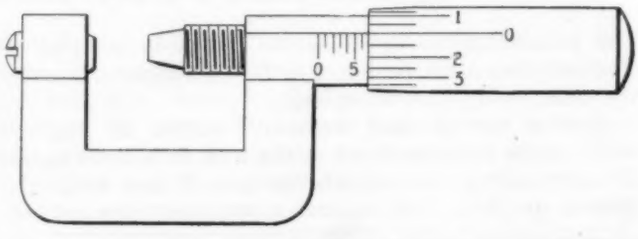


Fig. 2—The Palmer gage

of points where the metal is measured, were combined. Two years later Brown and Sharpe's pocket sheet metal gage was placed upon the market. Many improvements have since been made from time to time, but the general form and the appearance of the Laws gage have a marked resemblance to the present-day instrument. In fact the same thread of screw (forty) and the division of the barrel (twenty-five) were the same as now made.

In a recent letter to the Bridgeport Brass Co. the Brown & Sharpe Mfg. Co. states:

"I don't know what kind of an argument you can use to pry away the caliper from us, because this is such an intimate part of our micrometer history. In all of our writings relative to the micrometer, this caliper has been shown, and I believe that usually the Bridgeport Brass Co. has been indicated as the source. I think in considering the micrometer caliper, this caliper really set the well-known semi-circular type of caliper, while the Palmer caliper set the method of reading. It was a combination of the two that came about to form the present type of micrometer."

To realize how much present-day production owes to the possession of accurate measuring instruments, is to understand how important is the work of pioneers who have here and there added to the sum total of what constitutes modern manufacturing methods today.

Y & M V Shops at Vicksburg

By Howard Campbell

Many time and labor-saving tools in use—Arrangement of tool-supply—Dies and forming tools for blacksmith-shop—Air-tools—The brass foundry equipment

PROGRESSIVENESS is the order of the day in the modern railway shop. The antique equipment and obsolete methods of a decade ago are fast giving way to modern equipment, especially designed for the work that it is intended for and methods that, while still in the evolutionary stage, will bear inspection. Railroad shops, in the aggregate, form the largest repair business in the world. But many of the repair parts have to be made in the shops and the more progressive executives are reducing production costs and increasing production by the use of special tools and fixtures. The production of parts in quantities also tends toward systematic organization of the work, which in itself is a source of satisfaction to every real executive.

The shops of the Yazoo & Mississippi Valley Railroad at Vicksburg, Miss., are far from new, but the development of special tools and efficient methods has made it possible for this shop to keep up with the procession. Here a system of handling material is in effect that keeps the workman on the job. Requisition boxes are placed at convenient places about the shops in which material requisitions are placed to be gathered at regular intervals by a stores department messenger. All heavy materials are handled with an Elwell-Parker electric truck.

One of the interesting features of the shop is the arrangement of the tool-crib. The usual method of having all tools kept in bins that generally are out of sight of the workmen, and passing all tools out through one window, has been discarded for the arrangement shown in Fig. 1. The two sides of the tool-room facing the shop consist of a row of bins, breast-high, with an iron grating forming the upper section of the wall. The top of the bin forms a counter all the way around and the grating has been raised to leave an opening of six inches so that tools can be passed out at any point. Practically all of the tools will pass through a 6-in. gap, and those that are too large are handed out through small doors in the grating. Supplies and all small tools, such as drills and reamers, are kept in the bins under the counter, while the larger tools, such as wrenches, air-tools, chain blocks, sledges, jacks and so on are placed in racks where they can be seen by the workmen who call for them. Thus a workman can pick out the tool he wants at once and the men soon learn to come to that part of the counter nearest the tool required, which saves both their time and that of the crib-man. The amount of time saved and the lack of confusion are remarkable to one who has been used to seeing a crowd of men around one tool-crib window, each trying in turn to get the attention of the attendant and to describe the particular kind of tool desired.

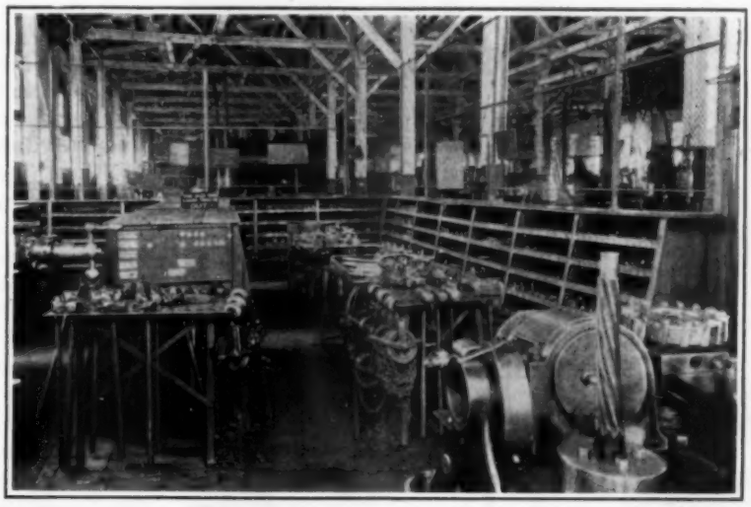


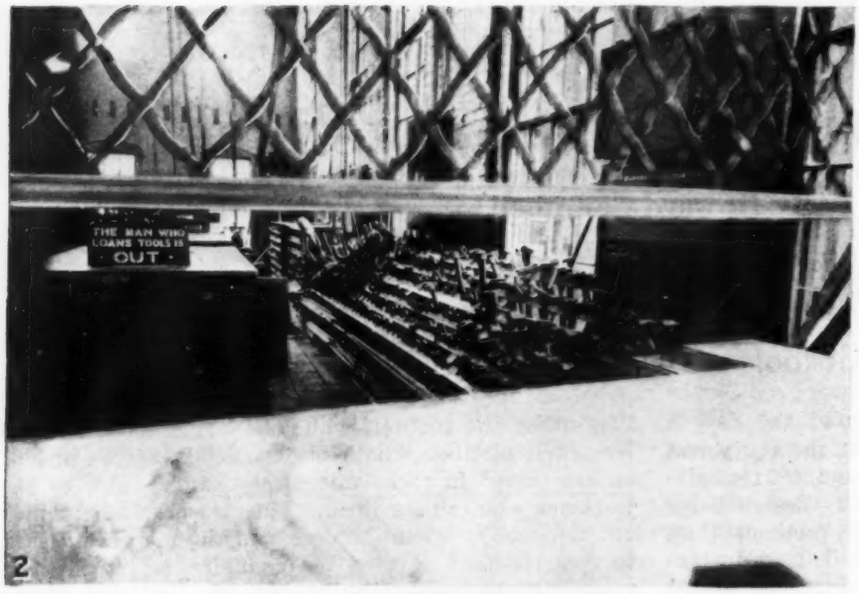
Fig. 1—Arrangement of tool-crib

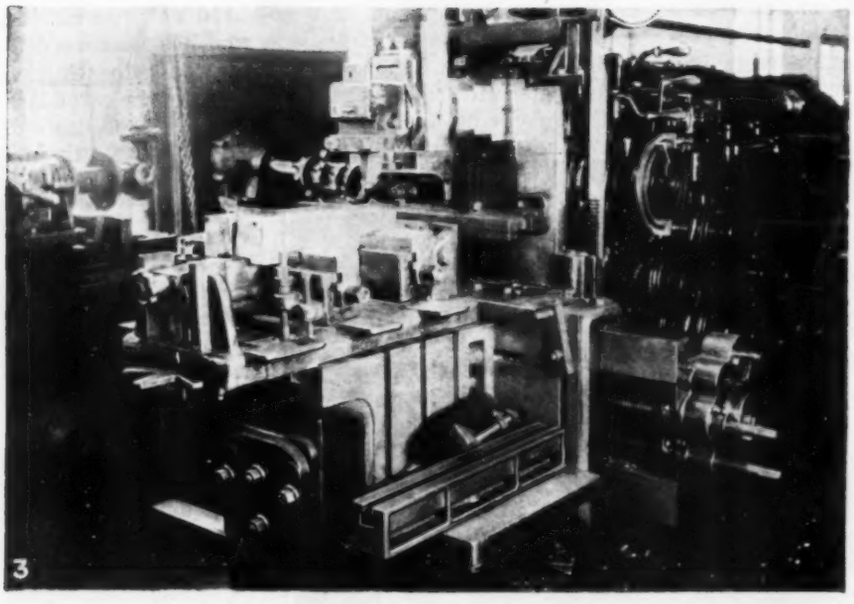
All large, irregular shaped wrenches are held in a rack, Fig. 2, where they are kept in order and can be easily seen from the front side of the counter. All small tools are returned to the crib every night, and such tools as a man may require continuously are returned every Saturday. Thus a careful check is kept, which results in a minimum of lost tools and automatically passes each tool through an inspection each day.

The machine equipment of the shop includes several Morton draw-cut shapers, one of which is shown in Fig. 3, set up to plane the top of a brass wedge. The wedge is held in a special fixture that eliminates the use of shims and makes it possible to locate the piece easily in the desired position. The cut-and-try method is unnecessary, as an adjusting screw provides for quick adjustment. The $\frac{3}{4}$ in. of stock is removed in two cuts and the job is finished in 30 minutes.

Engine-truck brasses are made in the shop's own brass factory, after which each is fitted to the master mandrel shown in Fig. 4. The mandrel is made to provide for four sizes, as shown. The brasses are usually made a little large, requiring a cut to be taken off each side. After the brass is fitted, it is sent to the tin-shop and babbitted for the bearing, and then is machined for the journal fit.

In the absence of a larger machine in this shop, the occasional job, such as shown in Fig. 5, is prepared on a No. 3 Cincinnati milling machine. The operation





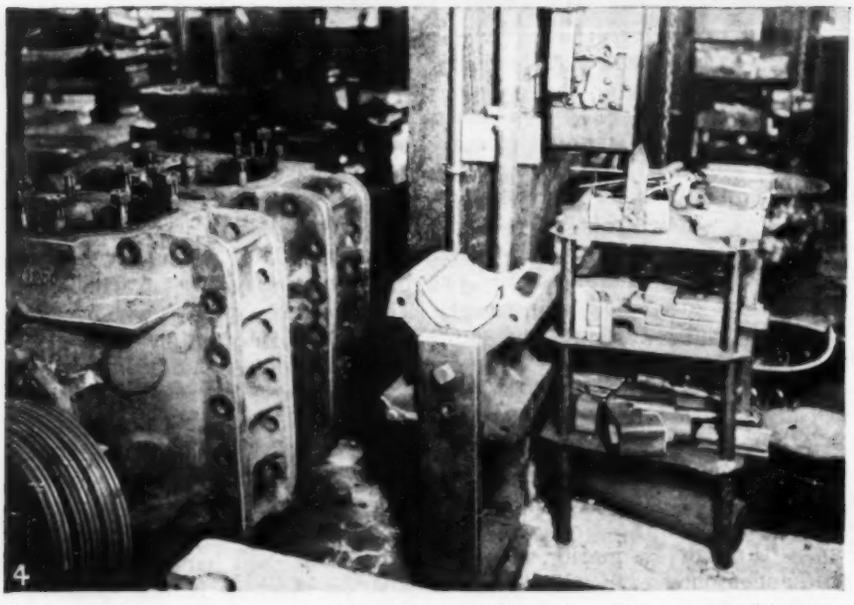


Fig. 2—The mechanic can select his wrench easily. Fig. 3—Machining a wedge. Fig. 4—Engine-truck brasses are fitted to a master mandrel

is milling the openings in the ends of knuckle joints. The joint is of forged steel and is held on the table by bolts and straps. A 2¼-in. cutter is used.

Piston-valve chambers on all classes of engines are bored with the self-centering cutters shown in Fig. 6. Power is supplied from an air drill through a train of gears bolted to the end of the cylinder. The plate that is bolted to the end of the valve chamber is turned so that the shoulder fits into the counterbore in the end of the chamber and thus locates itself centrally. Circular, inserted-tooth cutters, similar to those shown standing on the block, are used. The cutter selected is slipped on the bar and keyed in place and is fed by the usual star-feed. The solid cutter-head, with the several blades that each carries, is said to produce a better job, and in much less time, than is usually obtained with a single-point tool.

There are five sizes of cutters for each class of engine, the complete set including sizes by sixteenths of an inch from the diameter of a new chamber to the "condemned" size. The tool can be set up in 15 min. and the cut taken in the same length of time, making 30 min. for the complete operation. Piston-valve, bull rings and packing rings of sizes to correspond with the sizes of the above cutters are kept in stock, ready to install, so that no engine need be kept off its regular run for the purpose of installing these rings.

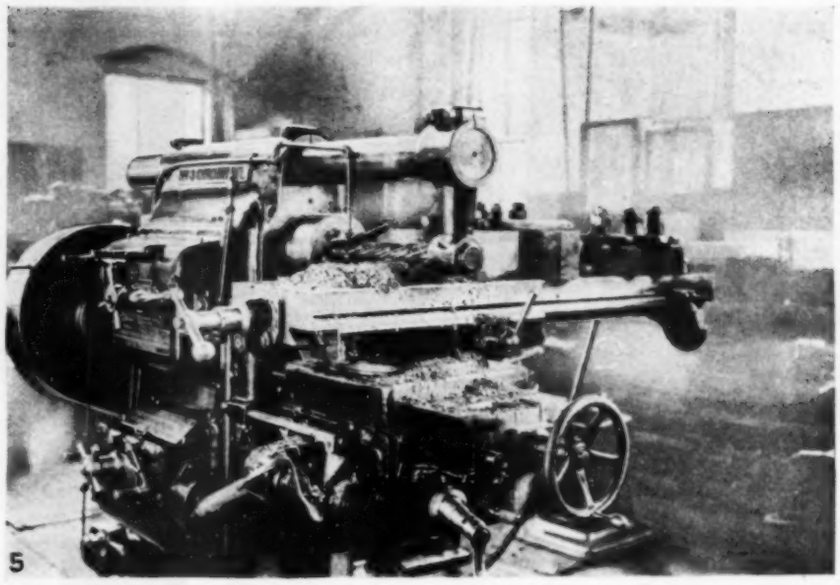
A mighty handy air-tool is the axle keyway-milling tool, Fig. 7. A block of the box-square type, *A*, is clamped to the axle. The top of the block contains a dove-tail slide *B*. An air-motor is attached to the slide in such a manner that an 8-blade end-mill can be inserted into the motor-spindle. A screw that revolves in a collar on the end of block *A* is threaded through a nut on the slide *B* so that it can be used to feed the slide in either direction. The two clamps that hold the block to the axle are each made of three pieces, hinged together. The side pieces are curved to fit the contour of the axle and the center piece is short and straight. A setscrew through the center section seats against the axle and locks the outfit in place. The keyway is laid out, then the tool is clamped to the axle with the cutter clearing the end and the motor is started. The entire job can be completed in 40 minutes.

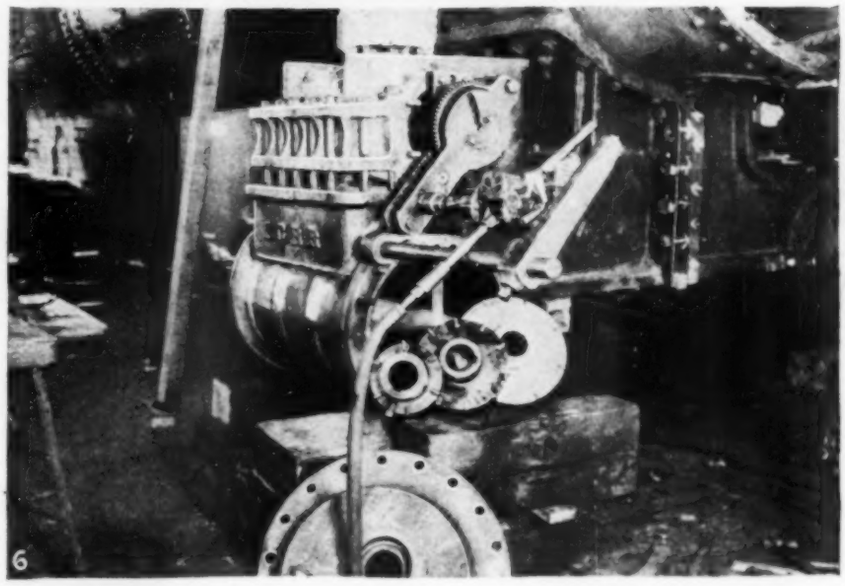
Another air-tool is the device for

milling keyslots in piston rods, shown in Fig. 8. The slot is laid out and a hole of the diameter of the key is drilled at the end of the lay-out at the correct angle to fit the taper of the key. Then the tool is clamped to the rod, a cutter of the correct diameter is inserted through the hole and power is applied, the tool being fed by hand lengthwise of the slot. The entire tool is held in position by the body *A*, which slips over the rod and is locked in place by means of setscrews. The motor-spindle passes down through the block on the shaft *B*. The upper end of the cutter locates in the spindle, and a pilot on the lower end locates in a block in the lower shaft *C*. The two shafts slide in the head *A*, the opposite end of each shaft being turned and threaded so that the strap can be put on and locked in place by nuts on the ends of the shafts. The feed consists of a large setscrew, threaded through the strap, carrying a feed-handle by which it can be turned. Operation of the screw forces the shafts and cutter toward the end of the piston rod, the shaft as shown having just been completed. The tool can be set up in five minutes and the operation completed in 20 minutes. Keyways ⅜ in. and under in the rods used on the smaller locomotives, can be most economically handled in this manner.

Bolt-dies that have become badly worn are annealed, hobbed with the tap *A*, Fig. 9, and rehardened. An old universal chuck *B* is fitted with sections, attached to the chuck-jaws, into which the dies can be inserted and locked, the jaw-adjustment mechanism providing means for setting the dies as required. The chuck is put on a lathe spindle and the attachment in which the tap is held is bolted to the tool-rest. Dies can easily be rethreaded with this outfit.

The other two heads *C* and *D*, Fig. 9, are for cutting super-heater tube holes in boiler-sheet. Each head carries two cutters, two of which are slightly longer than the other four. The two long ones cut a narrow slot just inside the tube diameter while the others trim the edges of the hole. With a cutter arranged in this manner, a round hole with a smooth edge can be produced in approximately five minutes. The small tools are for reaming seats in water-glass gage cocks, female cutters being provided on the opposite end of each tool to dress the end of the valve-stem.





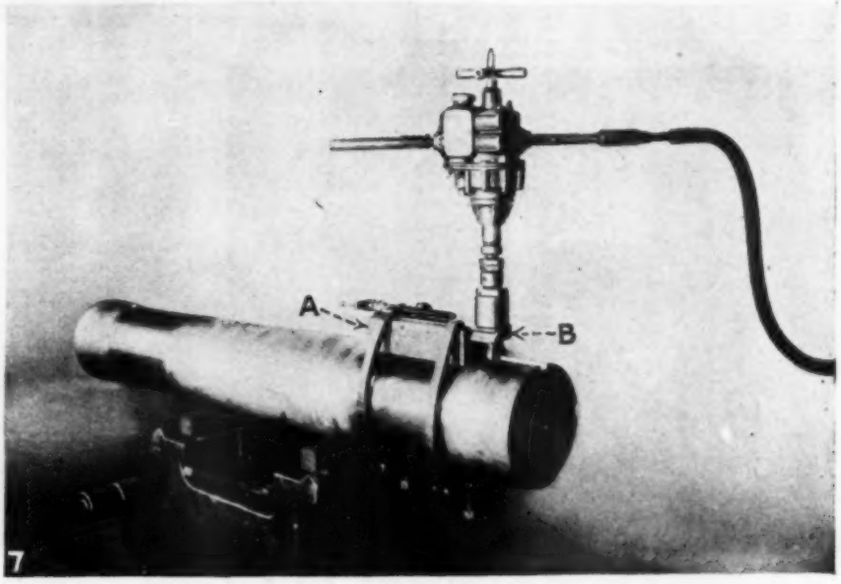
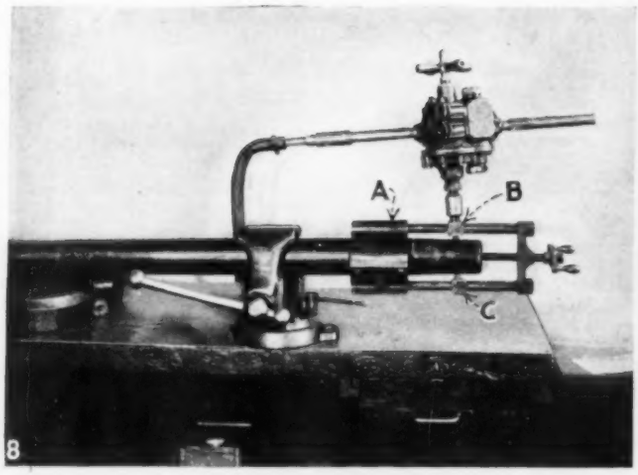
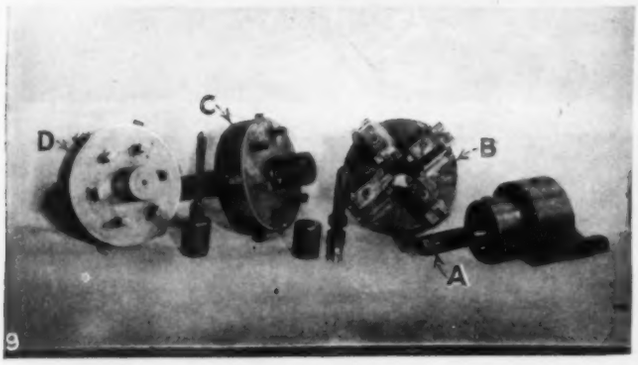
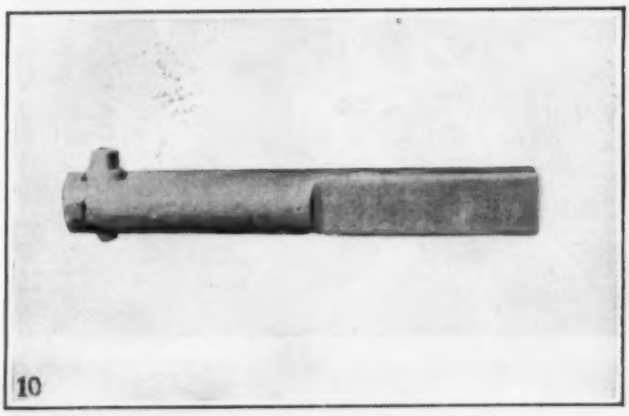
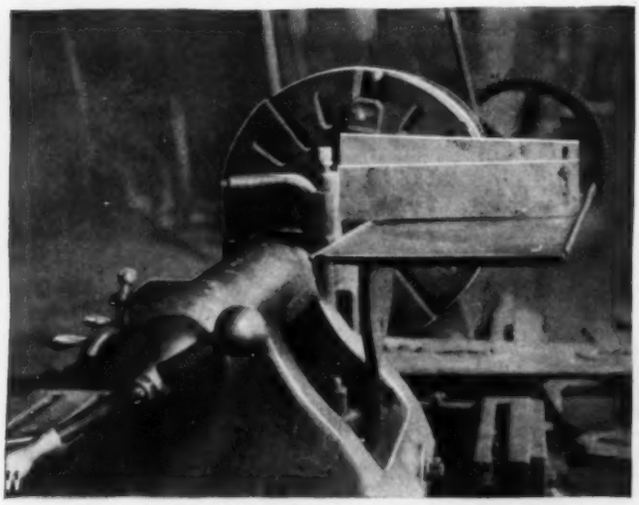


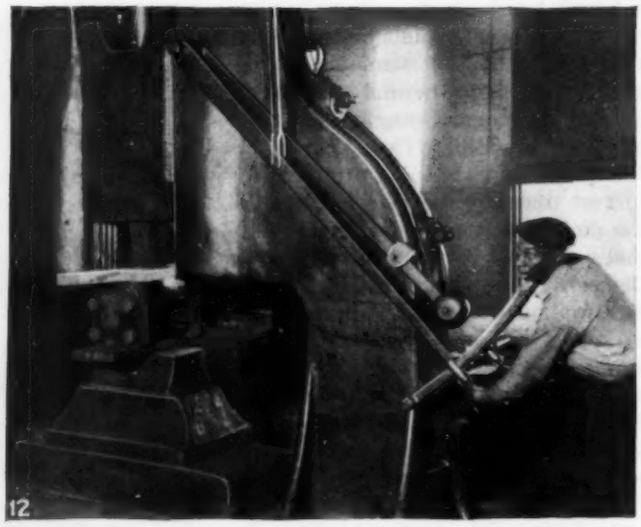
Fig. 5—Machining a knuckle joint. Fig. 6—Inserted-tooth boring heads Fig. 7—Milling a keyway











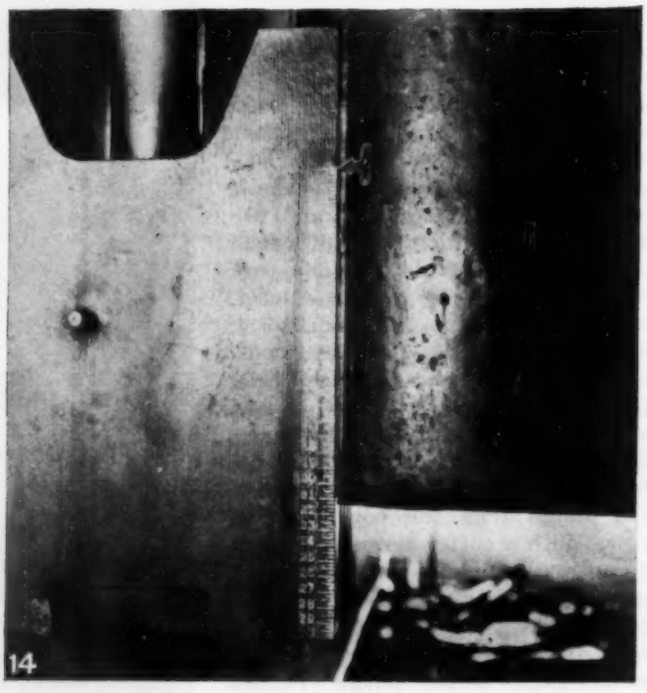
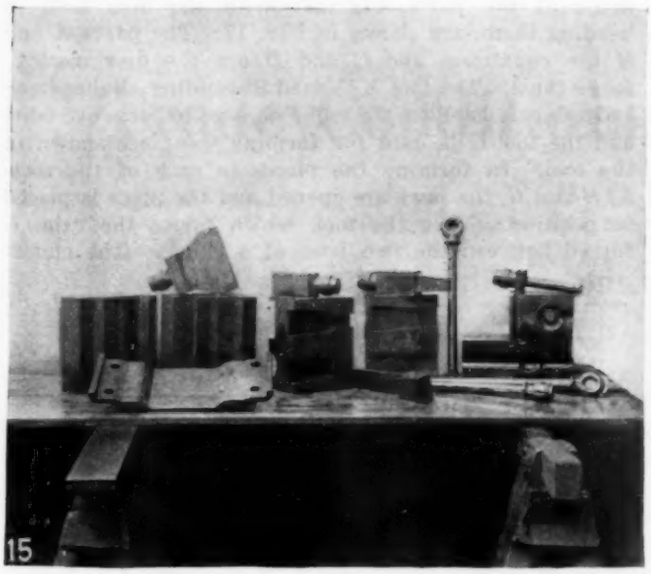


Fig. 8—Milling a key slot in a piston rod. Fig. 9—A collection of good tools. Fig. 10—A simple, but efficient, boring bar. Fig. 11—An excellent taper gage. Fig. 12—Ready to bend a rod-strap. Fig. 13—One minute later. Fig. 14—This scale should be in use on the steam hammers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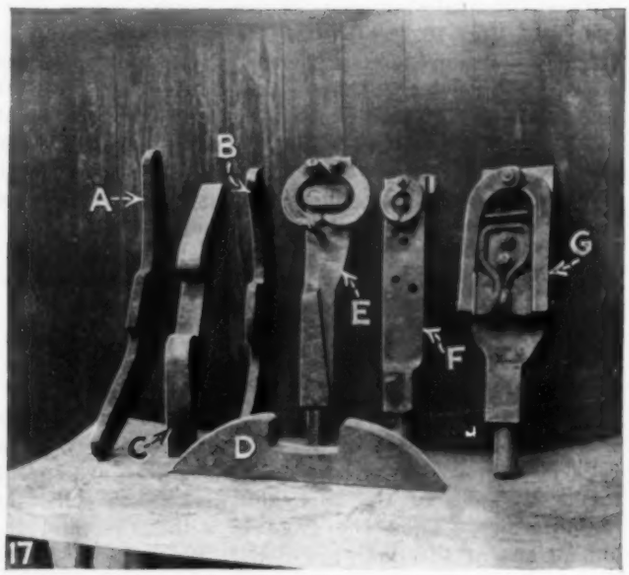

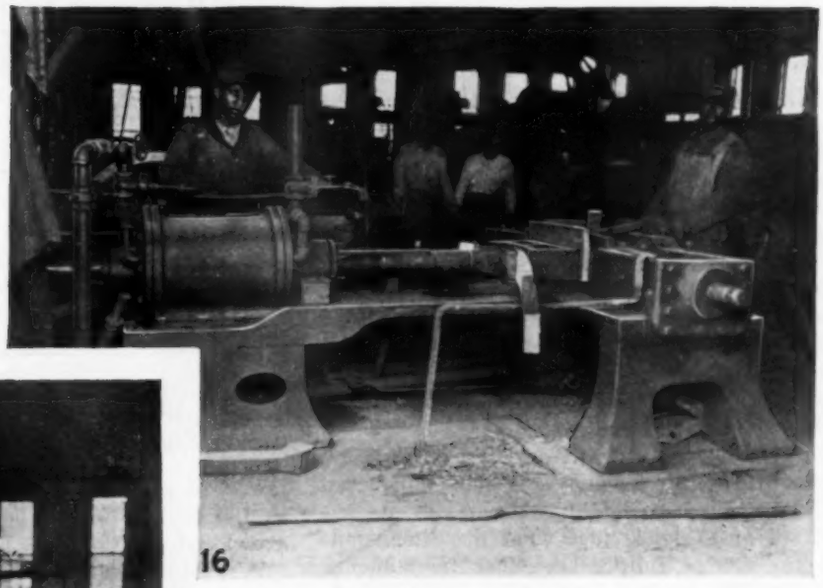
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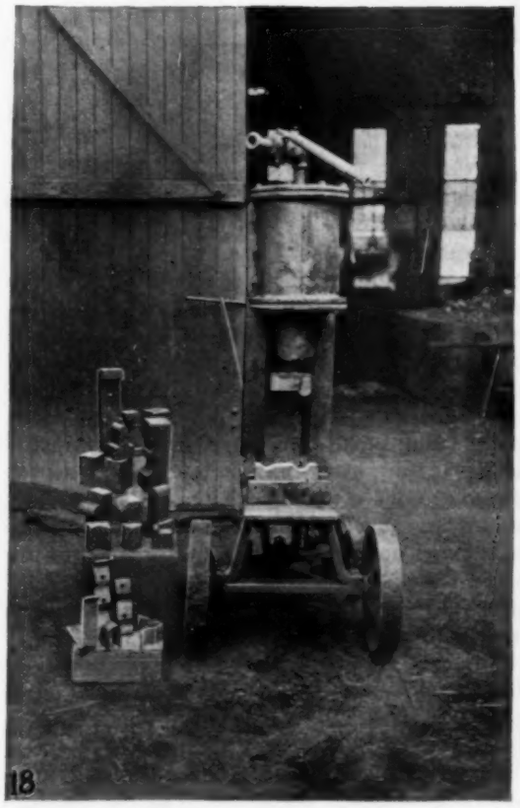
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Fig. 15—A collection of hammer-dies. Fig. 16—The "mechanical blacksmith." Fig. 17—Accessories to the mechanical blacksmith. Fig. 18—A portable air press. Fig. 20—Interior of brass foundry

An easily made but very efficient boring bar is illustrated in Fig. 10. A bar of the usual size is cut to length and squared on one end for the tool post, and a slot is milled—or shaped—across the center of the other end, for the tool. The slot should be of the same width and depth as the tool-bit that is to be used. Then a $\frac{1}{8}$-in. slot is cut in the end of the bar to a depth of approximately four times the size of the tool. A hole is drilled just back of the tool-bit slot, then it is tapped for a set-screw, the upper half of the hole is counterbored so the screw will slip in and a set screw with a collar, as shown, is put in.

The gage shown in Fig. 11 is used for gaging the taper in crossheads, although it could be used in making any kind of a taper fit. Two pieces of $\frac{1}{8}$-in. sheet steel with parallel edges are bolted together by a thumbscrew through a slot in one end of the pieces. The gage is inserted in the hole, then the pieces are spread to fit the sides of the bore and are locked with the thumbscrews. Then the gage is withdrawn and the dimensions at the ends are noted, which can be done by measuring from the edge of one piece to the same edge of the other. This gives the taper per foot.

Economy in the Blacksmith Shop

Blacksmithing departments are not, as a rule, considered when ways and means of reducing costs and expediting the work are considered, but the blacksmith shop in the Y & M V shop is an exception. A job that will serve as an example of the way in which the work is done is that of bending rod straps, which is done in one operation. The strap is heated to welding heat, then it is placed on a form as shown in Fig. 12, a square iron block of the correct thickness is placed on it and the ram of the hammer is let down until it rests on the piece. The ram is then slowly forced down, carrying the strap with it as it goes, and bending the strap to a shape as shown in Fig. 13.

By examining the edge of the ram, Figs. 12 and 13, a scale can be discerned. The scale is shown in detail in Fig. 14. It is graduated in inches, and by its use a smith can tell at a glance just what his dimensions are without the use of calipers or other instruments.

Although dies cost money, the saving in the blacksmith's time, the saving in material and the better quality of the parts produced make the expenditure for dies a good investment. An assortment of dies which could be made in any railway shop tool-room is shown in Fig. 15. The two dies at the left of the picture are used in bending tie-straps for "economy" draft gear. The center set of dies is used in forging shaker-bar handles. The heavy end of the piece is forged solid in the dies, then the punch shown lying on the dies is used to punch an opening so that the handle will slip over the end of the shaker-bar. The dies shown at the right are used in making column or box-chain bolts, samples of which are lying on the bench in front of the dies. On top of the dies is the punch that is used to punch the flash out of the eyes, which is done in a separate operation.

A home-made machine, but a very handy piece of equipment for the blacksmith-shop, is the "mechanical blacksmith," Fig. 16. It is a horizontal air-press, made with a cylinder, 16 in. in diameter by 18 in. long and with a ram 5 in. in diameter. The machine is used for bending stirrup hangers, U-brake hangers, equalizers, arch-bars and similar parts. The operation shown is the first bending operation on a 1¼x5-in. arch-bar. Some of the parts, together with the dies used in bending them, are shown in Fig. 17. The parts *A* and *B* are equalizers and *C* and *D* are the dies used to forge them. The tool *E* is used in bending clinker-hook and ash-hole handles, the tool *F* is used to form eye-bolts and the tool *G* is used for forming the piece shown in the tool. In forming the pieces in each of the tools *E*, *F* and *G*, the jaws are opened and the piece is placed in position. Then the tool, which forms the ram, is forced between the two jaws of a chuck. The chuck-jaws are adjustable, with rollers in the corners, and as the tool is forced between them, the hinged jaws are closed and the piece is formed as shown at *G*.

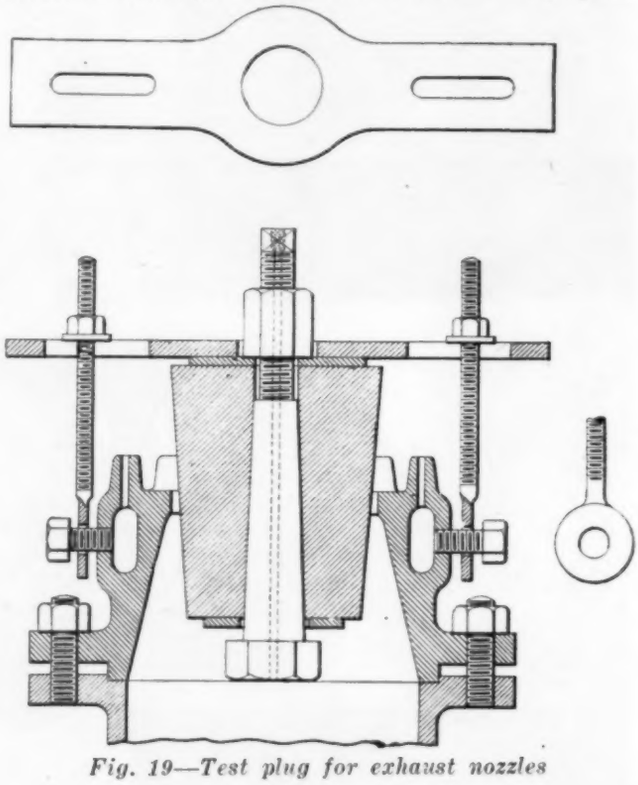

Fig. 19—Test plug for exhaust nozzles

A portable air bending-machine, made of an air-brake cylinder, attached vertically to a platform on wheels, is shown in Fig. 18. The machine is used in making pipe-clamps and small brackets, the dies for which are standing by the side of the machine.

The drawing, Fig. 19, shows a cross-section of an exhaust-nozzle with a rubber plug clamped in position so that the steam and exhaust pipes can be tested. The plug is 7¼ in. long and is an inch larger at the large end than at the small end. There are nine plugs in the set, the sizes varying by ½-in. diameters. The plug can be easily and quickly applied and saves a considerable amount of time over the old method of removing the exhaust tip and applying a plate and gasket to the exhaust nozzle.

One of the features of the shop is the brass foundry, where locomotive brasses, hub liners, rod brasses, shoes and wedges, knuckle-pin bushings, hub plates and washout plugs for the shop are cast. The metal is melted in an oil-burning smelting furnace, shown in Fig. 20. Approximately 450 lb. of brass are melted at one pouring and four or five heats are poured per day, only one molder and a helper being required. The convenience of being able to make the parts most needed and the independence of commercial sources of supply will show the advantages of an institution of this kind.

Trade Conditions in South America

By C. F. Meyer
Foreign Sales Manager, Landis Machine Co., Waynesboro, Pa.

Some of the reasons why we should cultivate trade at this time and suggestions as to methods—Conditions and how to meet them

WITH the signing of the Armistice, the lucrative European business which many of us had enjoyed for years, took a gradual and natural turn toward the machine tool manufacturers of England, France, Germany and Switzerland; until now that market is practically closed to us. This applies to all machine tools with the exception of a few specialties and high-production tools. Faced, as we are with this condition, we have had to look for a new outlet for a portion of the products of our recently expanded plants. Immediately South America came into the minds of many of us as the logical territory and rightly too; for here we have a group of countries most of which are blessed with unlimited natural resources and ready for a gradual but healthy industrial development.

There are about as many opinions on industrial conditions in South America as individuals expressing themselves thereon. Even among those who have had an opportunity to personally study the ground, complete unity of thought is lacking. It depends so very largely upon the manner of penetration, the industries visited, individuals interviewed, and then on the proper analysis of this multiplicity of data. My own investigations were limited principally to the Republic of Brazil, Uruguay, Argentina, Chile and Peru. These countries are all important industrial markets, so let us take the time to consider them geographically and industrially.

Details of the Several Countries

Brazil has an area of 3,300,000 square miles, somewhat larger than the United States, excluding Alaska. It is formed of twenty states and one federal district and has a population of over 20,000,000. It is looked upon as the coming industrial country of South America. Uruguay is about equal in size to the New England States. Its population is 1,250,000, 350,000 of which live in Montevideo, the capital. This little country impresses one with an air of prosperity, solidity and thrift. It appears to be entering upon an era of industrial development.

Argentina is the second largest state, having an area more than one-third as large as the United States, not including Alaska. It is claimed to have a population of 8,000,000, approximately 25 per cent of which lives in Buenos Aires.

Chile has an area of about 300,000 square miles, practically four times the area of New England. The estimated population is 3,500,000, with the smallest percentage of illiteracy in South America. It has a coast line of about 2,700 miles, as far as from Boston to Salt Lake City, and a width varying from 50 to 250 miles. The northern 500 miles of coast line are a barren waste practically without a tree or blade of grass. This barren waste, in which rain seldom, if ever, falls, has been nature's storehouse for nitrate.

Peru has an area of about 500,000 square miles, about seven times the area of New England. The population is estimated at 3,500,000 people, a large proportion of whom are Indians and mixed races. The wealth of Peru is at present in her mines which, unfortunately for that country, are under foreign control.

Railroads Are Important

The railroads form an important part of the industries of South America. The railroad shops are as a rule well equipped and well managed. They absorb the usual line of machine tools employed in the American railroad shops. The tramways also have excellent shops, which come in for their share of machine shop equipment. Then there are the arsenals and navy yards. These are, in the majority of cases, small, but nevertheless they must be equipped with up-to-date machines.

In Chile, the nitrate fields and in Peru, the mines, absorb their share of machine shop equipment. Brazil and the Argentine are primarily agricultural countries, but there seems to be a concentrated effort on the part of the people to supply their own wants.

Visit the principal cities of the South American Republic, and you will find that each and every one has its quota of automobiles. The streets of many are congested beyond the imagination of the average American, but apparently little is known of the art of regrinding internal combustion engines.

Both Argentina and Brazil have been flooded with German machine tools which were manufactured at a very low cost. These machines, as a rule, occupy prominent positions in the show rooms, while the American machine tools which the dealers are handling under exclusive agency arrangements, are placed in the background. Here one sees German copies of well known American machine tools which are being offered the trade as substitutes. A close inspection of their literature reveals the fact that it is just as much a copy as the machines themselves. Many of these machines are being sold at prices ranging from 25 per cent to 50 per cent below the prices of similar American machine tools. In their eagerness to convert these machines into cash, the German manufacturers have demoralized the market further by offering unheard-of terms.

In order to more fully understand the South American markets, we must consider the importation of machine tools from the dealer's viewpoint. When he imports a

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machine he has an immediate cash outlay to cover duty and other expenses. This outlay is considerable and applies to goods shipped on consignment as well as on open account. Goods sold to the various Government Departments and to the British owned railroads of the Argentine can be brought in free of duty, but duties once paid on goods which are ultimately sold to the Government are never refunded. This places still another burden on the shoulders of the dealer and discourages the carrying of stock. Then, too, the interest rates in Brazil are high, the maximum being 12 per cent per annum. These rates naturally restrict borrowing or over-drafts for the ordinary business. Once a sale is made, the dealer must give terms which are never less than 60 days and in some cases terms of 240 days must be extended. Thus a firm which is a perfectly good credit risk is unable to meet cash or sight draft terms from the manufacturer because of the lack of surplus capital.

Manufacturers Help Dealers

The majority of the dealers in South American countries have little more than a sufficient working capital and they naturally look to the manufacturers for financial assistance. The British, Belgian and particularly the German manufacturers, have answered their call while many of the American manufacturers still continue to quote their respective lines cash against shipping documents f.o.b. New York City.

The usual terms asked for by the dealers of the South American countries are 100 days from the date of the arrival of the goods at the port of destination on an open credit basis. Ninety to 120 days sight, or date, drafts are also quite common. The latter is preferable from the manufacturer's point of view, because of the fact that sight drafts begin from the date of acceptance of the goods. The time required for shipments from New York City to reach the port of destination is often from 30 to 40 days so that a 90-day sight draft may run for 120 or 130 days before payment is made.

There are more than enough responsible machinery dealers and importers in both Brazil and the Argentine who could market our respective lines for us without confliction, but at the present time, there are only a few who show any interest in American machine tools. They say that the German manufacturers have met their requests for special terms and other conditions and that they will continue to avail themselves of this cheap source of supply as long as it lasts.

The manufacturers in the South American countries are beginning to realize that they must decrease their manufacturing cost if they are to compete with the imported goods. This means that up-to-date equipment must supplant their obsolete machinery. The cheaper lines of such tools are now in the hands of the Belgians and Germans, but inferior quality of their machinery is telling againts them.

Quite recently, an Englishman who holds a high position in one of the most important railroads in South America was severely criticized by one of his fellow countrymen for favoring certain American machine tools as against similar British made articles. His retort was that he favored only the tools which gave his company the best and cheapest results.

South America certainly offers a market for American machine tools and are we to stand by and let our neighbors increase their export business when we can retain and even add to what we now have by exerting some real sales effort? At the present time, the American manufacturers must rely on the dealers who are only interested in a half-hearted way. The dealer may be the best available, but the question is, is he good enough? Has he the technical staff that can go out and talk the machine in an intelligent manner and if necessary back up such statements with actual demonstrations? In plain English, can the dealer sell your machine on its merits in the face of keen competition which exists at the present time?

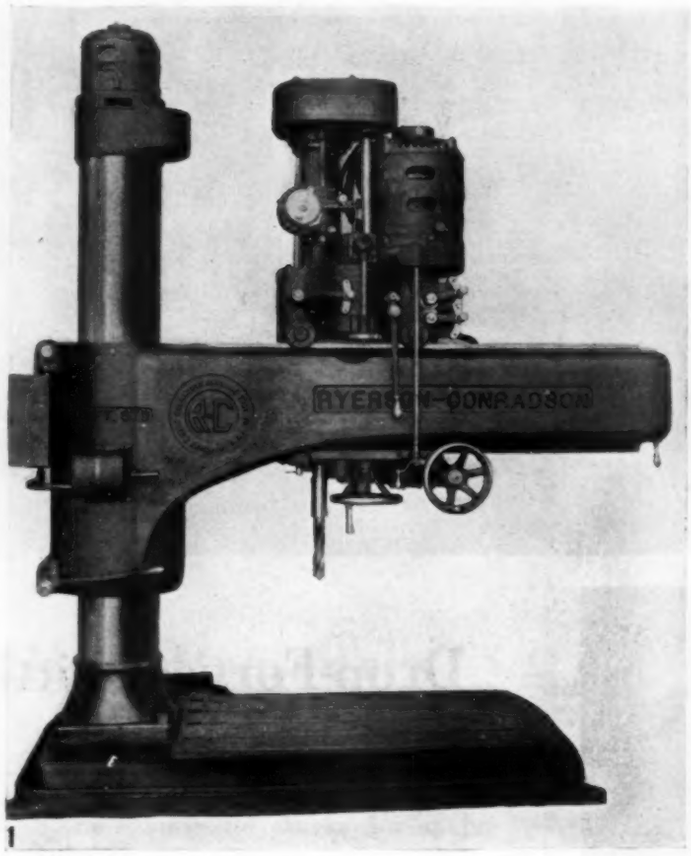
This problem is of enough importance to warrant our most careful consideration. It might be advisable for the various members of this association to organize themselves into groups of six or eight and appoint a special representative for each group. The special representative should be responsible to a chairman appointed by the group and should be relied upon to divide his time equally. He should be a man who is familiar with the laws and customs of the countries, a man who knows the language and preferably one who has had experience in the South American field. He should spend a sufficient amount of time at the plant of each member of the group he is to represent in order to learn his lines.

If the special representative is to be successful, he must meet these people on common lines, forgetting if necessary his own individuality and nationality. The German manufacturers have studied this phase of the game which accounts to some extent for their general success. The expense of such a project would have to be divided. A fair distribution would be for each member of the group to assume an equal share of one-half the total expense and a percentage of the balance pro-rated on a basis of the volume of sales for a certain period. It would seem that this would be the logical solution as the burden on any manufacturer would be comparatively light.

Data on the Argentine Market

The Argentine market differs from all other markets in that its industries are divided into two distinct classes, namely the railroads and private plants. British capital controls about 85 per cent of the railroads of that country and it is the policy of this group to purchase the majority of their equipment through their London offices. The local dealers cannot participate in this business and it will be necessary for the American manufacturers of machine tools to take this into consideration in formulating their plans. The best and only way to secure a share of the business of the British owned railroads in the Argentine is to place the matter in the hands of some English firm or individual who is in close touch with the local officials and also known to the officials of the London offices of these railorads. In other words, they must be able to have the equipment specified on the indents which the local officials send to their London offices and then oversee the placing of the orders through some London connections.

The railroad shops form an important group of the industries of South America. They are, as a rule, patterned after the railroad shop of England. They are well designed, well equipped and well managed. One cannot fail to be impressed with their appearance. The engineers in charge know their business and they are ever on the lookout for tools and equipment which will enable them to improve their method or lower their manufacturing costs.



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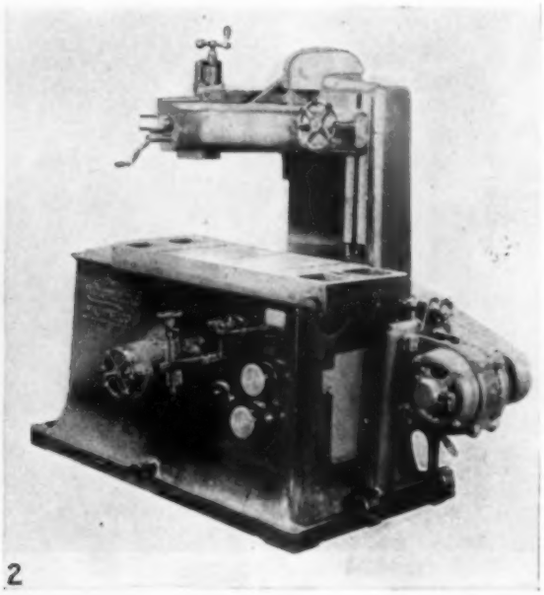
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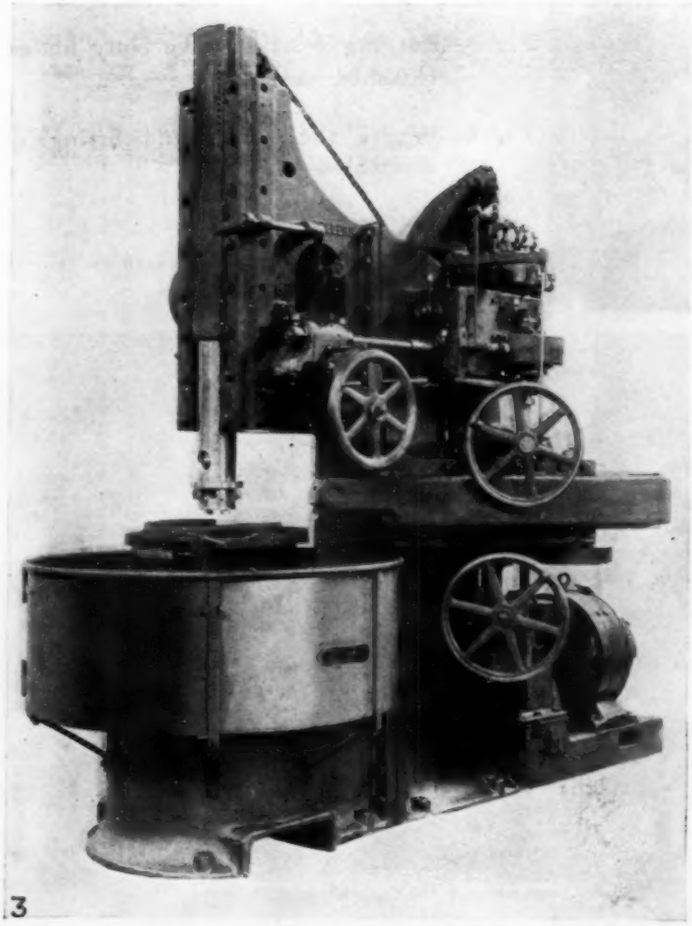
Modern Methods of Mounting Motors

Fig. 1—Ryerson-Conradson 5-ft. radial

Fig. 2—Automatic Machine Co. small, open-side planer

Fig. 3—Sellers driving-box boring and facing machine

Fig. 4—American geared-head lathe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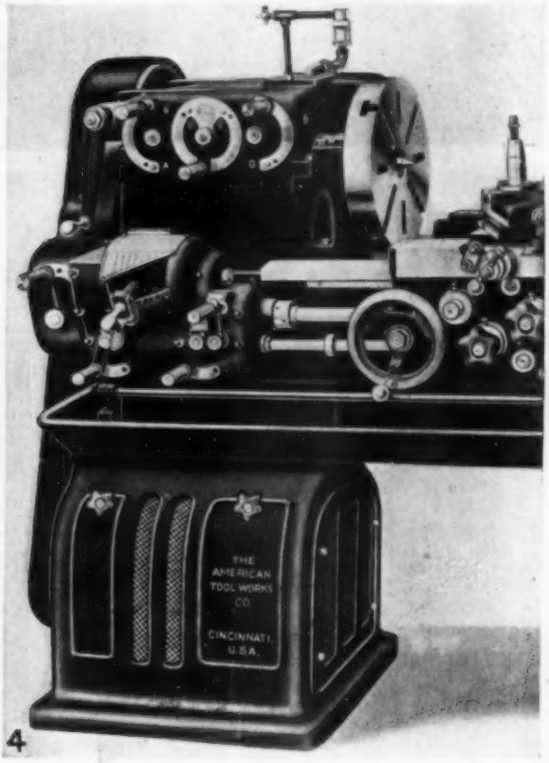

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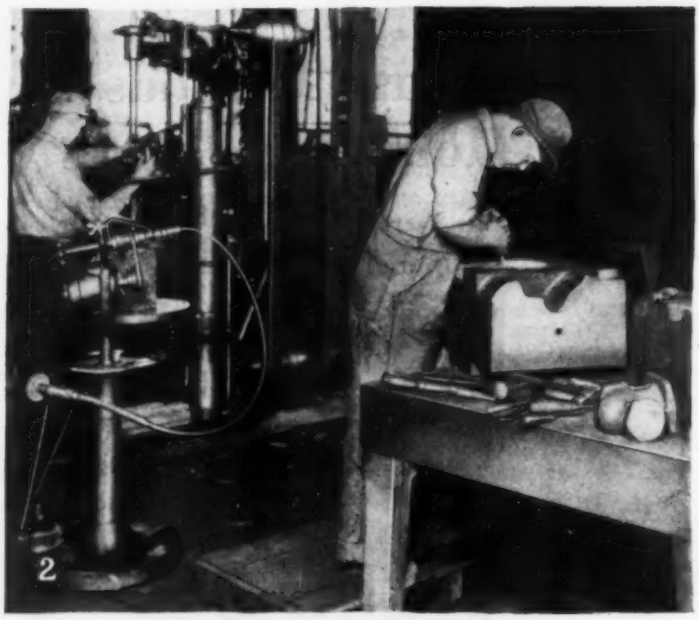


Drop-Forged Fittings

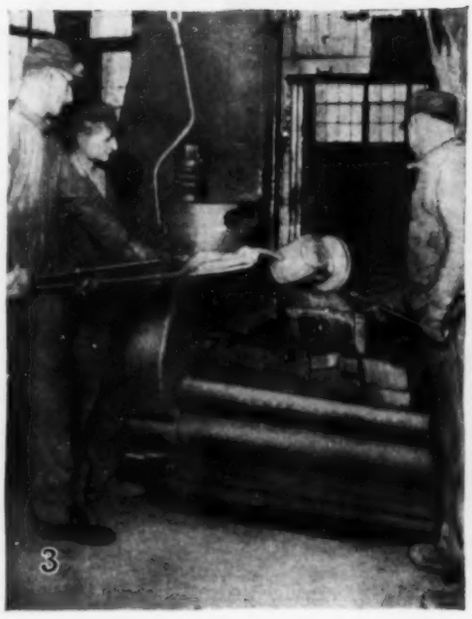
Fig. 1—Forge shop with hammers 1,000 to 10,000-lb. capacity

Fig. 2—Corner of the die-sinking shop

Fig. 3—Forging a large valve body under a 10,000-lb. hammer

Fig. 4—Where the valves and fittings are assembled

Photographs through the courtesy of the



For High Pressures

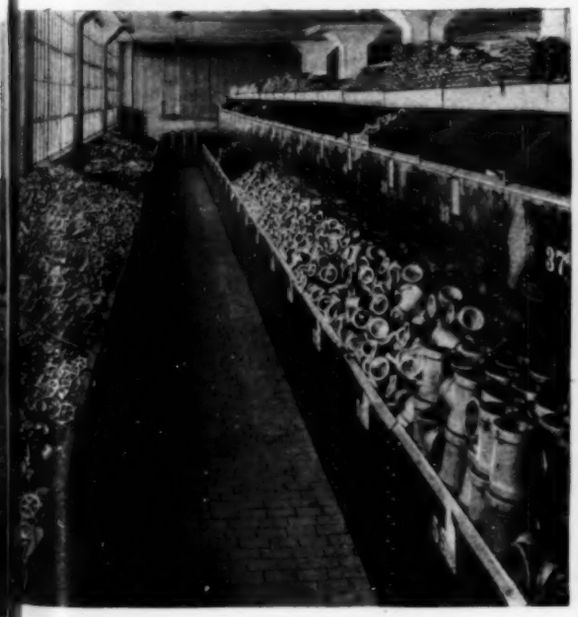
Fig. 5—One corner of the machine shop

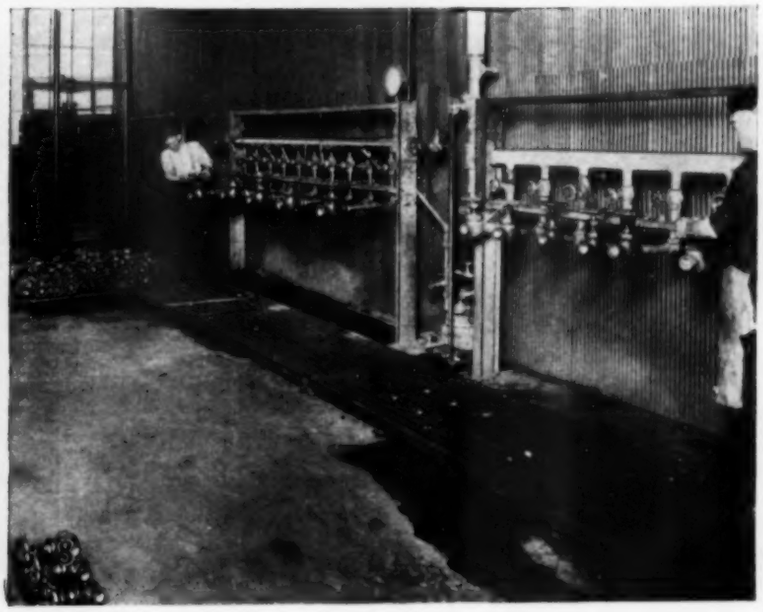
Fig. 6—Storage bins and trucks for rough forgings

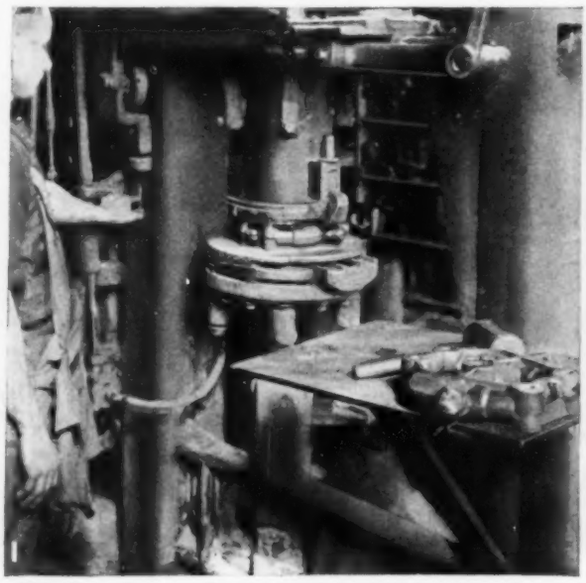
Fig. 7—Similar bins and trucks for finished stock

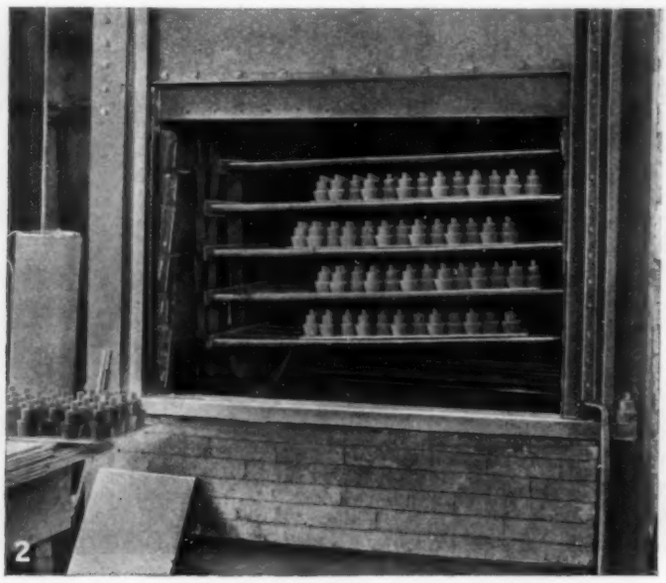
Fig. 8—Where valves and fittings can be tested up to 10,000 lb. per square inch

Henry Vogt Machine Co., Louisville, Ky.









Machine Equipment for the Foundry

Fig. 1—Core molding machine

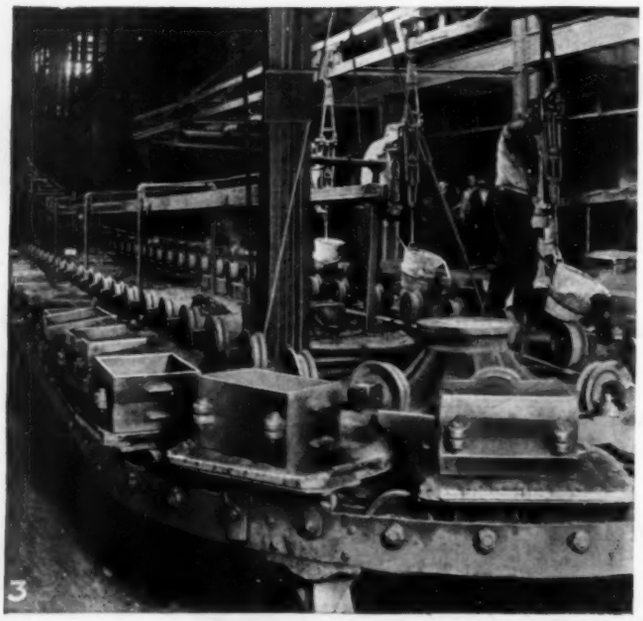
Fig. 2—One of the core ovens

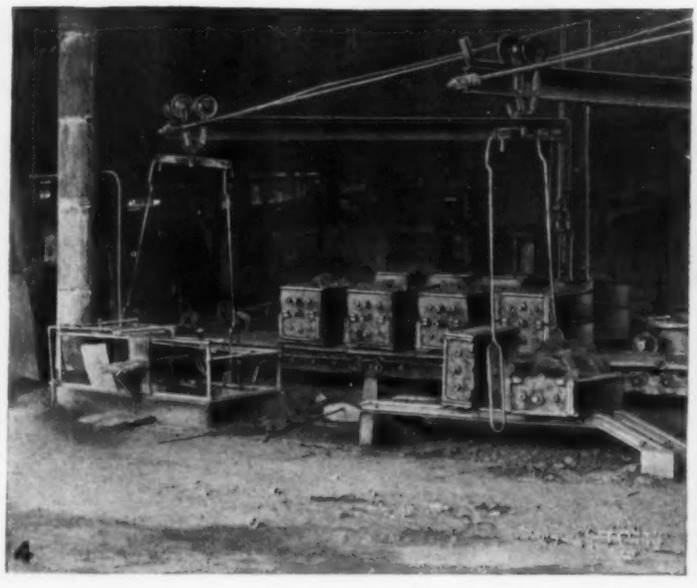
Fig. 3—Continuous pouring floor

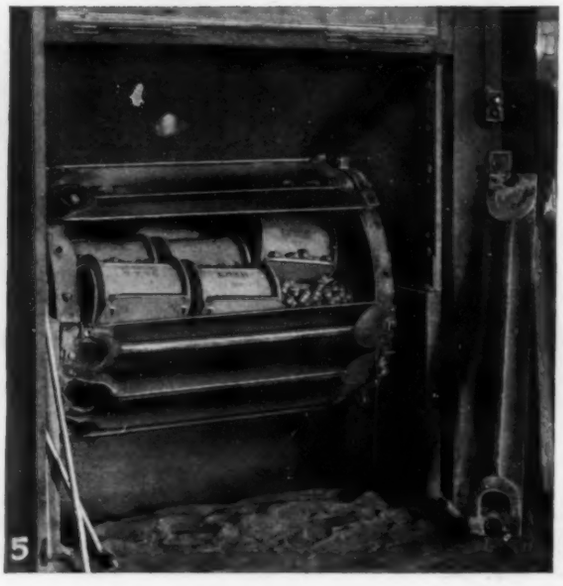
Fig. 4—Where molds are shaken out

Fig. 5—Tumbler for brake cylinders

Photographs by courtesy of the Westinghouse Air Brake Co.







Automotive Production

Building the Chrysler Motor

By John Younger
Associate Editor, *American Machinist*

Use of standard machine tools—Operations on the cylinder block—Cleaning by live steam—Honing—Methods of inspection — Good results from accurate machining

IN DECIDING to build the Chrysler car it was felt that the best results would be obtained by complete re-tooling to suit the elements of the car. Each part was carefully analyzed as to how best it could be made, and at the same time how most economically. Standard machines were considered first, as it was felt that they were more flexible than single-purpose or specialized machines and at the same time lent themselves, under the proper arrangement, to just as economical manufacture. Naturally, if a specialized machine tool was found superior in quality as well as productive of lower costs, it was adopted, but generally speaking the standard machine tool had the preference.

Another reason prompted this, and that was the question of tooling. A complex specialized tool often demanded elaborate jigs or fixtures and their cost was considered with the tool. On the other hand a simple machine usually required a simple fixture which could be made accurately as well as economically and this was often a governing factor.

As stated, quality of workmanship is a primary consideration. It is responsible for the use of the single honing spindle for finishing cylinder bores as shown in Fig. 1. The first honing is done in a six-spindle machine, one of which is shown in the same illustration, but more accurate and uniform bores have resulted from the use of the single spindle machine. A similar idea is carried out in the boring operation, a multi-spindle machine being used for the rough boring and a single spindle for the final boring or reaming just before honing.

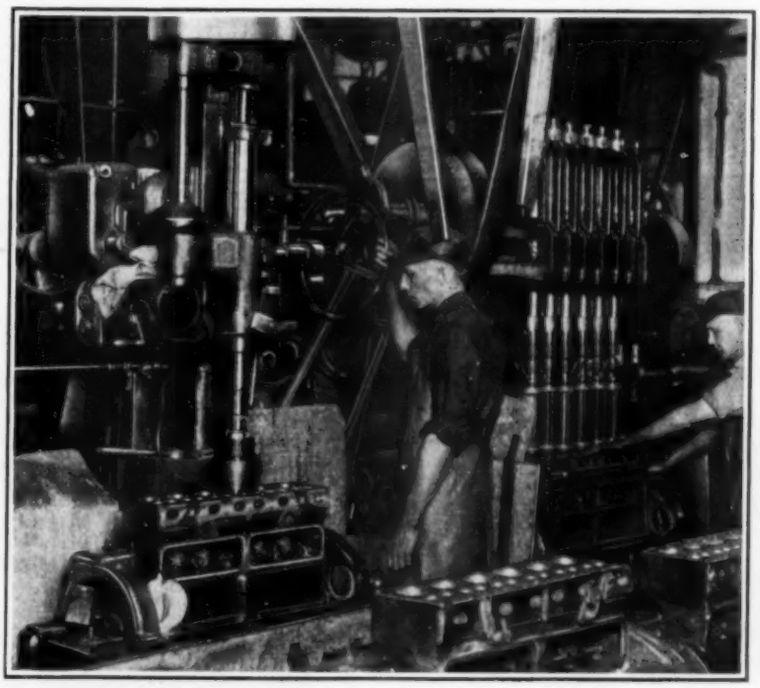
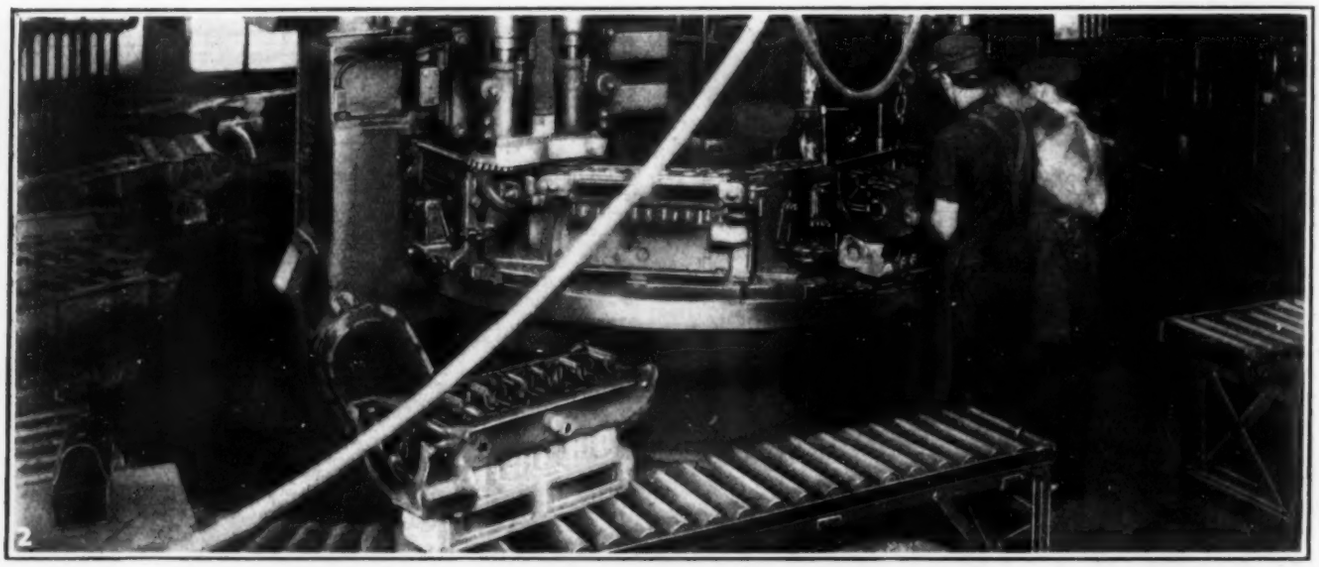
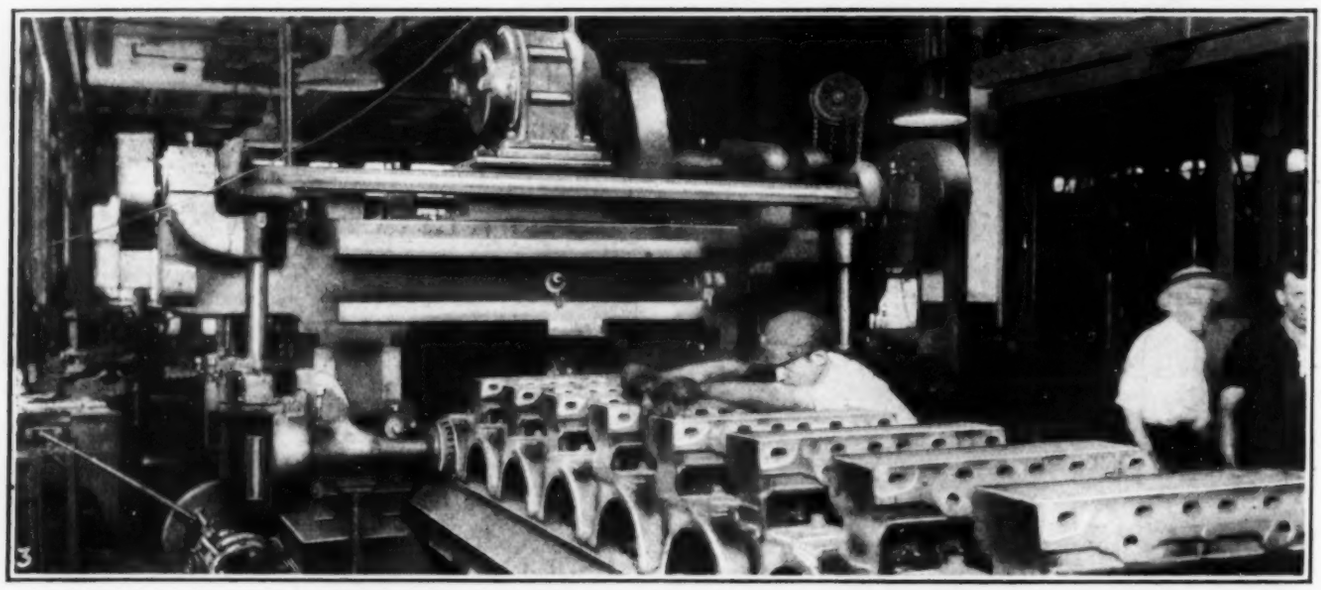


Fig. 1—A single honing spindle for finishing cylinder bores

The stones used in the rough-honing operation are "U" shaped, the edges of the "U" forming the cutting surfaces. This design gives much freer cutting and leaves a better surface. Flat stones are at present used in the finishing operation, but the "U" shaped stones are being tried out experimentally.

An important factor in checking the quality of the work is the inspection system. Four traveling inspectors test each and every gage each day and at night all micrometer gages are turned in and checked for accuracy. Duplicate jigs are used and each time a jig is returned to the tool room it is checked and maintained in original condition. Line bushings are used throughout for drill jigs. In addition to the usual gages for routine inspection, there are the super or master gages held in the tool room and kept strictly for checking purposes. All taps, for example, are tested with the West & Dodge machine. Johannsen gages are used to check micrometers and other tools. In this department are located the blue prints, which are checked out like tools. These prints are mounted





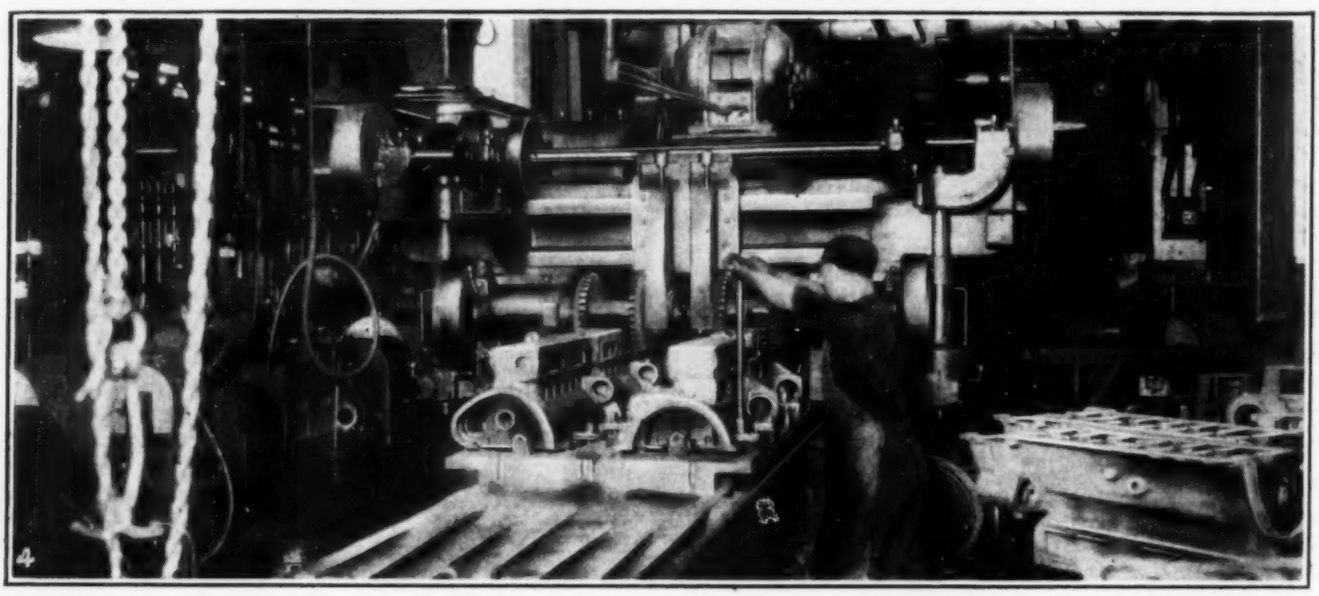
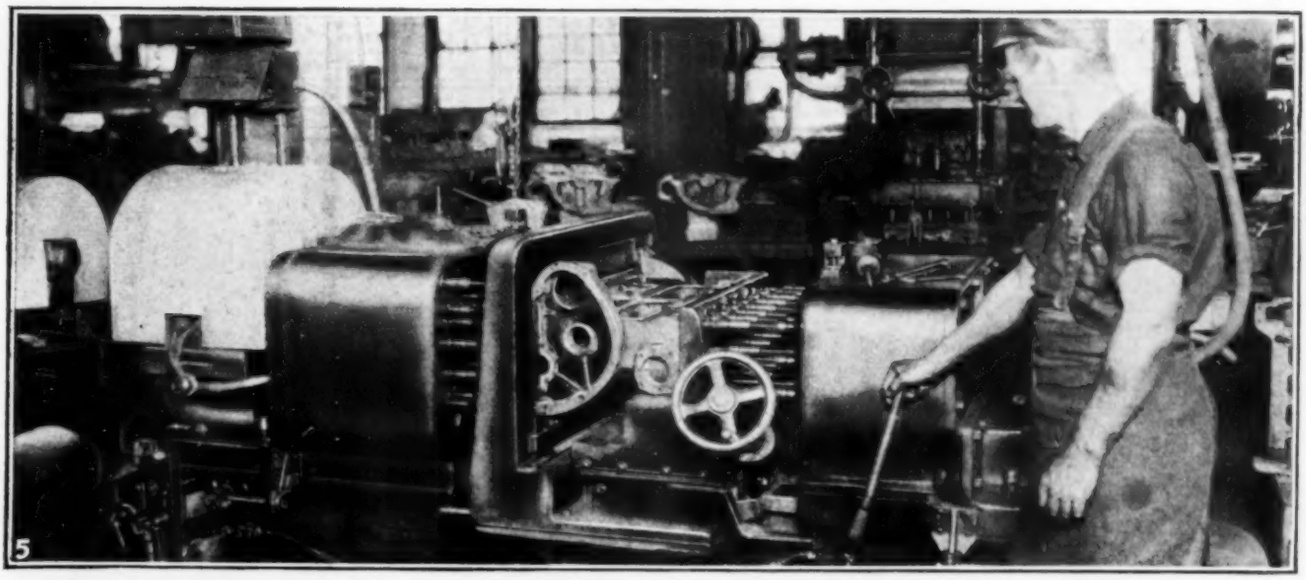
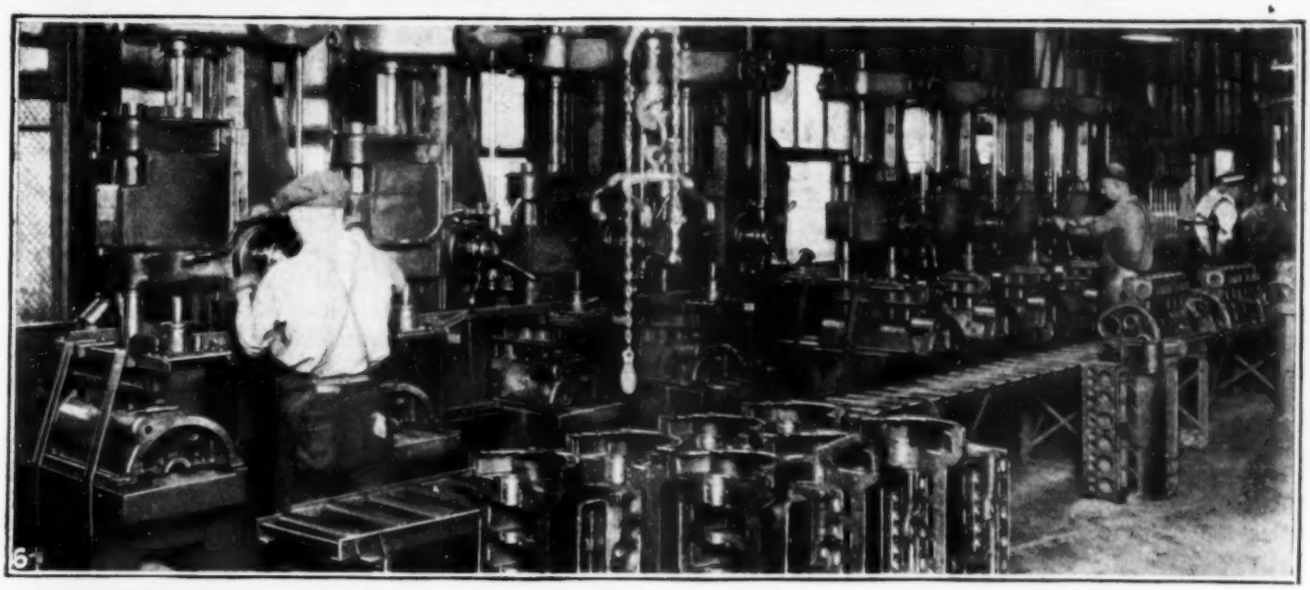


Fig. 2—Roughing and finishing upper and lower faces of cylinder blocks. Fig. 3—Milling ends of cylinder blocks. Fig. 4—Milling sides of cylinder blocks





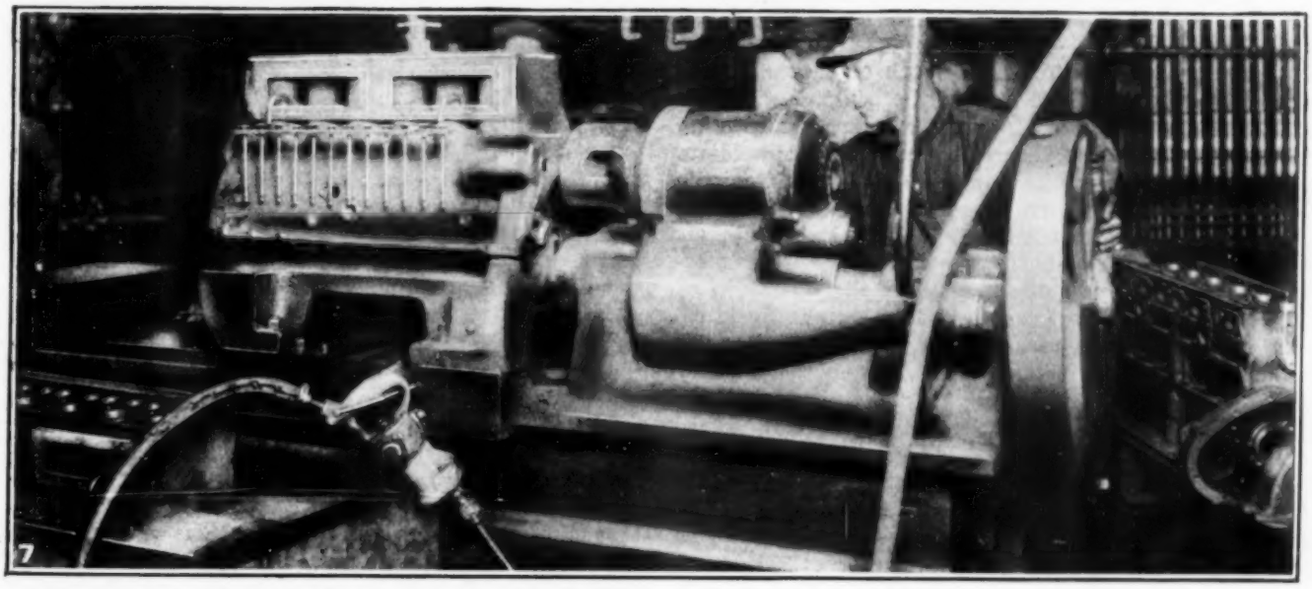


Fig. 5—Multiple drilling, both sides of block. Fig. 6—Finish-boring and reaming. Fig. 7—Grinding face of transmission housing

AUTOMOTIVE PRODUCTION

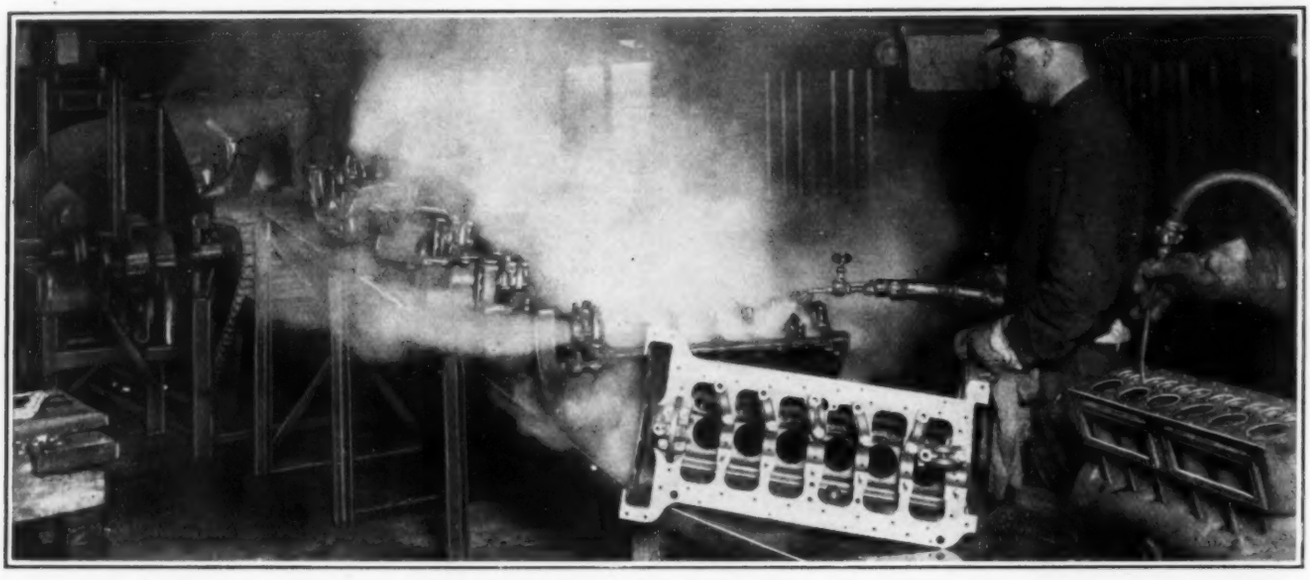


Fig. 8—Cleaning cylinder blocks with live steam

on a 16- or 18-gage sheet steel panel turned over at the edge.

The engine block represents the most important unit in point of size and number of operations. In the Chrysler the cylinder block is integral with the upper half of the crankcase and the unit is of semi-steel (a mixture of 75 per cent cast iron and 25 per cent steel). The first operation is carried out on a 126-in. Newton rotary milling machine, Fig. 2. The blocks alternate first with cylinders up and second with crankcase up, the upper and lower faces being roughed and finished. The use of a small air hoist is shown in the illustration as is the roller conveyor used extensively throughout the plant.

After the milling operation the locating holes for all succeeding operations are drilled in the face of the crankcase, and the block is conveyed to the large Ingersoll milling machines. On one of these, Fig. 3, the end faces are milled and on the other, Fig. 4, the sides are milled. Note that in the latter, two rows go through at a time. Thence, after some intermediate operations, the block is conveyed to the six-spindle Moline drill presses where it is rough bored to 2.775 in., inspected and semi-finish bored to 2.895 in. Boring is then left alone for a short time while some less important operations are completed, until the operation of rough boring the crankcase in a four-spindle Rockford drilling machine is reached. In this operation the crankshaft hole, the self starter hole and the impeller hole are bored at one setting.

Some simple drilling and reaming operations follow, and then the operation "Drill all holes in both sides" is performed in a Greenlee 101 drilling machine, Fig. 5. On similar machines the holes in the top, bottom and ends are finished, and in others these holes are tapped. After a few more minor operations the cylinders are finish-bored to 2.990 in. and reamed to 2.9995 in. in a line of Foote-Burt drills, Fig. 6. One man operates the four spindles of the machine and, as stated, only one bore is reamed at a time. The lapping or honing operations on the cylinder bore as already touched on and shown in Fig. 1, follow. The sequence is completed with a finish-milling operation on a Newton rotary mill and a grinding operation on the face of the transmission-housing, Fig. 7, in the special fixture shown. In this operation the block is located on the locating holes and supported also in the crankshaft bearings.

Using Live Steam for Cleaning

A variation from usual practice is shown in Fig. 8. Live steam is used as a cleansing agent to cut out grease, oil and dirt from the block. This is the final operation before sending to inspection and assembly.

There are four inspections and fifty-one operations in the complete sequence. On the final inspection thirty-five gages are used.

Reverting to the boring of the crankshaft bearing holes, this operation, with its second reaming, is done so accurately that when the Chadwick bearings are laid in position, the crankshaft is placed and the caps are tightened down, the shaft has just the proper clearance to rotate smoothly and easily. This result has been accomplished without the use of a line reamer or any tool in the bearings themselves. It represents an accuracy of about a half thousandth of an inch in the machining of the crankshaft bearings.

Keys and Keyways

The S.A.E. has voted to include a table of Woodruff Keys, giving the dimensions and tolerances as established by the Whitney Mfg. Co., as a part of its data for standard keys and keyways. It was also recommended that dimensions for keyways in shafts and hubs be included for as many classes of key fits as investigations may indicate to be desirable, and that the report on keys and keyways should include square keys, taking into consideration the present S.A.E. Standards for shafts and shaft fittings.

Rejuvenating Worn Cutting Tools

How a Detroit shop is saving money for manufacturers by reconditioning worn cutters, drills and reamers

IN THESE days of high-production machines driven to the maximum limit by operators working on a piece-rate basis, the life of the cutting tool is a matter demanding serious consideration. Some of the materials to be cut are so hard or tough that a relatively small number of pieces can be machined between grinding of the tools. As a consequence, tool life is short and tool expense correspondingly heavy. That it is an economically sound practice to reclaim cutters and reamers after they have been reground in the factory as many times as possible is evident from the success of such tool reclaiming companies as the National Grinding Co., Inc., 144 East Woodbridge St., Detroit, Mich., in whose shop the accompanying photographs were taken.

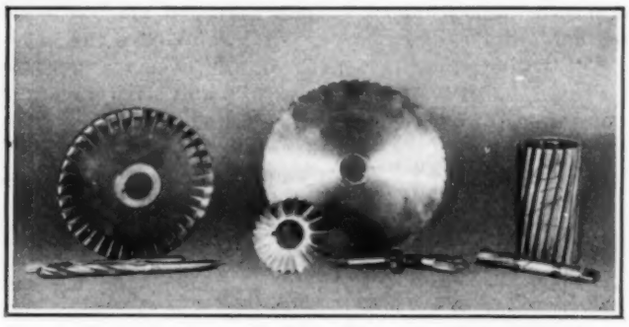


Fig. 1—Cutters, drills and reamers as they are sent in to be reclaimed

A pretty fair idea of how cutters, reamers and drills look when they come to this shop to be rejuvenated can be had from Fig. 1. How the same tools look after they have been reconditioned will be evident in Fig. 2. One of the specially rebuilt machines used for the purpose is illustrated in Fig. 3. The machine is a grinder built by the Diamond Machine Co., but rearranged so that there is no oil on the table ways. As rearranged, the table moves so easily that it can be run back and forth all day by means of the lever shown at the right without any fatigue to speak of on the part of the operator. Various arrangements of work-holding elements are used to take care of the different types of tools to be reground. As shown, the machine is set up for regrinding an end mill although none is in place.

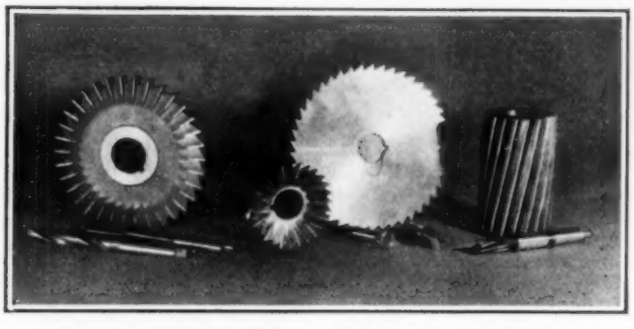


Fig. 2—The cutter shown in Fig. 1 after treatment

A complete record of each job is kept on one of the cards illustrated in Fig. 4. The function of the space under the word "remarks" is to call attention to any special instructions on the part of the cutsomer. If such instructions accompany the order, they are recopied on the back of the card and the statement "see special information" is rubber stamped on the card. If there is no special information of this sort, the card is simply stamped "no special information."

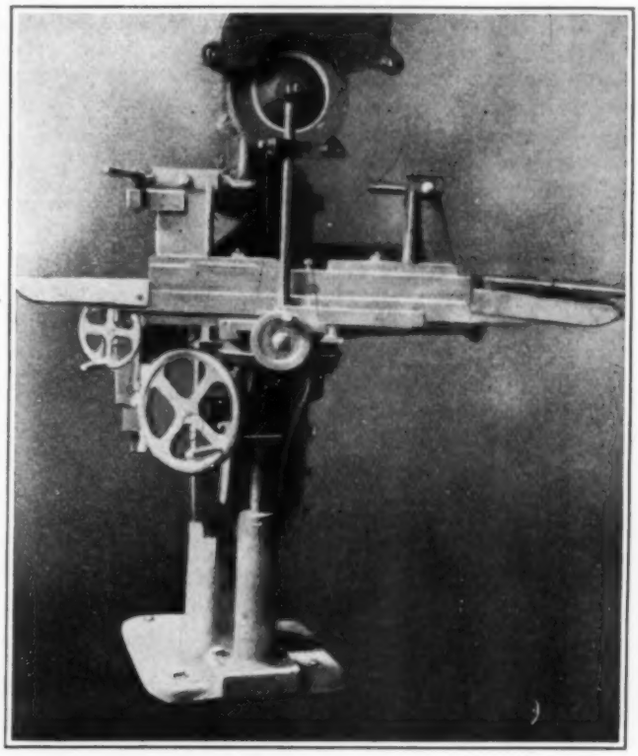


Fig. 3—One of the special grinding machines used in reclaiming cutters

As the tools are received, they are carefully inspected for cracks or any other imperfections and then file-tested for hardness all over. No regrinding is ever done on soft work. If a soft tool comes in it is sent out to be rehardened before anything else is done.

The operations performed in sequence on a side milling cutter are as follows:

(1) Circle grind the cutter to get within the broken teeth, if there are any, and to have the corners square unless otherwise specified.

(2) Grind the sides to get within the limits of broken teeth. At the same time, the thickness is reduced to the final size specified on the order, provided such a specification has been made. For example, it may be required to reduce a $\frac{1}{4}$-in. cutter to a $\frac{7}{32}$-in. cutter.

(3) Recess or undercut the web and true up the hub.

(4) Recut the piece on the diameter.
(5) Recut the piece on the sides.
(6) Dip in a mixture of nitric and hydrochloric acid for a period of time determined by judgment as to the strength of the acid and its temperature. Next dip in water, then in soda water and finally dry in sawdust.
(7) Sharpen the piece on the diameter.
(8) Sharpen the piece on the sides.
(9) Polish the hub to the same thickness as the finishing end.
(10) Etch the new size on the cutter.

For a plain milling cutter, the cycle of operation is somewhat simpler. It is as follows:

(1) Circle grind.
(2) Recut piece.
(3) Dip in acid, water, soda water and dry.
(4) Sharpen teeth.
(5) Polish sides.
(6) Etch new size on cutter.

Twist drills are generally received with the points broken off. In any case, the first operation is to cut off the point, which is then ground to be used as a center. The next step is to repair the shank and grind on a new tang if necessary, as it usually is. The shank is next recentered. If a new tang or shank is required,

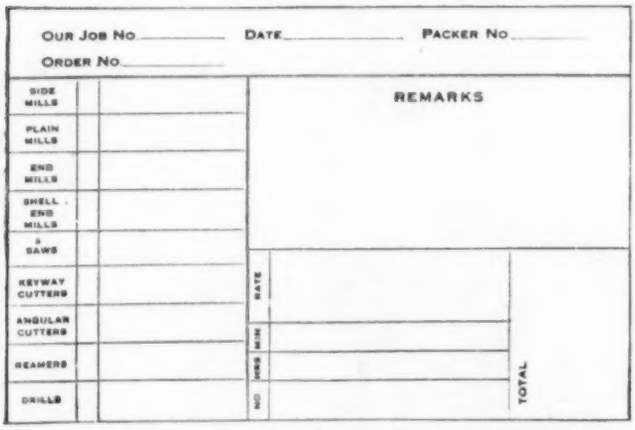


Fig. 4—Record card used in keeping track of the work

it is butt-welded on. The drill now being what might be called completed as a rough job, has the recess between groove and shank ground out. The shank is then ground to standard gage and the drill is brought down to the new size plus 0.005 in. After this, the clearance is ground and the drill is dipped as described above. Finally, it is finish ground and the point is ground. The new size is then etched on the tang.

In reconditioning reamers, the tang is treated in the same manner as described for twist drills. Next, the diameter is rough ground to the specified size plus 0.005 in. and the flutes recut. The next step consists of recutting the neck $\frac{1}{32}$ of an inch below the flute. The work is then dipped as already described and then finish ground. Finally, it is sharpened and the new size is etched on as before.

All of this sounds decidedly simple, but success can only be attained as the result of considerable experience. The men engaged in this particular work have been doing it for years and can be regarded as experts. As an instance of the efficient basis on which the work is done, it may be said that one of the large automobile manufacturers reduced his tool cost per car 17 per cent as a result of taking advantage of the service offered by the men whose work has been described here.

Refusing to Build Special Machines

By John R. Godfrey

"Say, Godfrey, I had a shock yesterday. Ran across a machine-tool man who had sand enough to turn down an order. First time it's happened since we were fighting to make it safe for European borrowers to forget they owe us anything. Here's how:

"We've got a special job of forming, sort of a cross between a punching and bull-dozer proposition, so I asked the man from the Blank Machine Co. to come in and look it over."

" 'Yes, Mr. Johnson, you can do the job that way and save money, but it means a special machine—and we don't build 'em. Sorry, but I can't take the order.

" 'I'll give you the benefit of any of my experience on this kind of work. You can probably save money by buying one of our machines as a foundation and putting on such attachments as you need. But it's a job-shop proposition and we've been stung too often to play that game any more. We're off special stuff for life.

" 'From what I've heard of you, Mr. Johnson, I think you're an exception and don't expect something for nothing. But "rules is rules" you know and we have to play safe. That change would take a lot of time in the engineering department and in the shop. It would upset routine in the shop, even if we're not very busy, and would actually cost us more money than most buyers are willing to pay.

The Cost of Re-designing for Special Orders Is Prohibitive

" 'Just let me tell you of an experience a while ago, Mr. Johnson. One of the big companies wanted to buy forty of our machines—if we'd change them to suit their ideas. Now forty machines is a real order these days and I hot-footed it up to see the grand chief of the check book.

" 'They wanted so many changes that it meant redesigning the driving end of the machine. I figured that it would cost us ten thousand dollars in engineering, patterns and shop tools, besides upsetting things in the shop. So I explained the case to him and told him we'd take the order at the regular price, plus the ten thousand and with the assurance that the next order would be duplicates of these machines.

" 'That didn't suit him at all. He wanted us to assume the cost of making the changes, that no one else is likely to want, and take a chance on the future orders. By the time he wanted more, he'd probably coax some other builder who was hungry for orders to do the same thing and then there would be two of us fighting each other for the next order.

" 'So you see why we've cut out the special stuff. There's nothing in it until the buyer gets educated to the point of paying what such changes are really worth.' "

"Say, Godfrey, I admire the man's sand even if it did sort of put me in a hole. I'd have paid him his price but I've got to suffer for the short-sighted guys who want to get something for nothing. So I made a deal with him to have his engineer design the attachments for us and we'll build 'em here. If the other builders had his backbone they'd come nearer paying dividends than they have the past few years."

Machine-Tool Builders for 77 Years

By Fred H. Colvin
Editor, *American Machinist*

An outline of the growth of William Sellers & Co., Inc., and some of its contributions to the machine tool and other industries

THE firm of Wm. Sellers & Co. was founded in 1848 by Edward Bancroft and William Sellers under the name of Bancroft & Sellers, and began business in the Kensington District of Philadelphia as millwriting engineers, making transmission details, shafting, hangers, pulleys, etc., and machine tools. (Mr. Bancroft was a brother-in-law of William Sellers.)

In 1853, the business was removed to the present location, 1600 Hamilton St. In 1855, upon the death of Mr. Bancroft, the business was continued by William Sellers and John Sellers, Jr., under the firm name of William Sellers & Co. In 1873, Messrs. Coleman Sellers, J. Sellers Bancroft (son of Edward Bancroft) and James C. Brooks were admitted to the firm. In 1886, the firm was incorported under the present name with the following elected officers:

William Sellers, President (see Fig. 1).

John Sellers, Jr., Vice-president.

J. Sellers Bancroft, Manager.

Justus G. Schwacke, Secretary.

Coleman Sellers, Engineer (see Fig. 2).

The only surviving member of the officers of the corporation is Mr. Schwacke who is now the president and general manager.

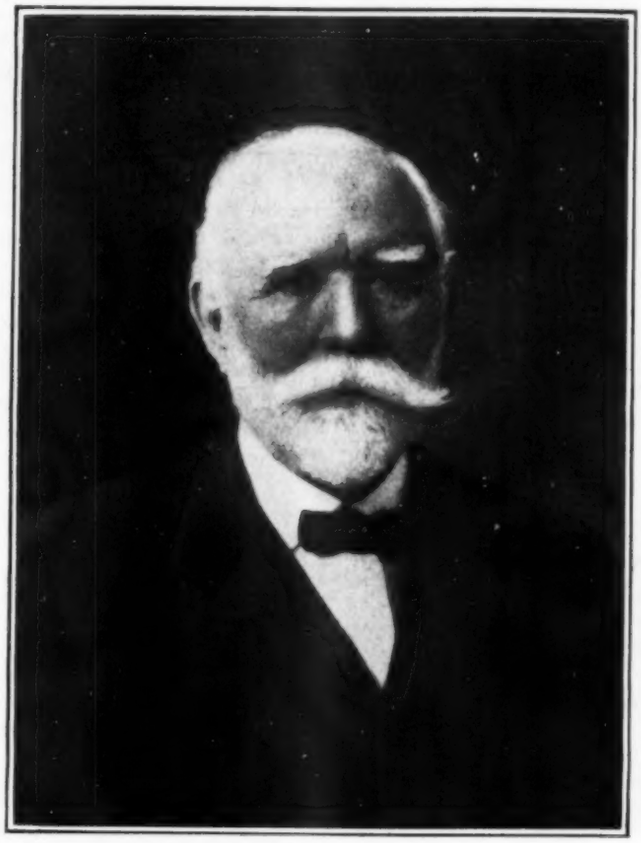


Fig. 1—William Sellers

At the time the firm was founded, and for some time thereafter, it was the practice to sell transmission details by the pound, and it was obviously to the advantage of the builders to make the parts unnecessarily heavy. Recognizing that neither such designing nor selling was good practice, the design and introduction of parts suitable for the work to be performed was begun, and the firm was the first to introduce the sale of such parts by the piece instead of by the pound.

Bancroft & Sellers introduced the ball and socket line-hanger and pillow-block bearing in 1849, and the double-cone vise or compression coupling in 1856. Examples of these bearings and couplings were ordered by a number of European technical schools, state and civil, following the Paris Universal Exposition in 1867, where they were included in the exhibit of Wm. Sellers & Co., and many subsequent foreign visitors to the Sellers works who attended those schools have referred to the fact that those bearings and couplings formed a part of their education.

About 1855, the firm commenced building locomotive turntables of cast iron, equipped with the Parry anti-friction center. These turntables were rapidly adopted by practically all the prominent railways and were largely used until the great increase in the weight of locomotives made the cast-iron structure inadvisable, so that the building of cast-iron turntables was discontinued in 1916.

Changes in lathe construction were notable. From about 1849 to 1860, the bed had one raised and one flat rail, with the head carried upon two V-s. The screw was used for turning and screw cutting; the turning feed was by cone gears; the slide rests of larger lathes swiveled but had no cross feed. About 1856, or even earlier, a rack was provided for hand traverse of the carriage. In 1860, the bed with flat ways was built and about 1861 the Sellers friction-feed disks were used with a separate feed rod for turning. About 1862, lathes were built having a power cross feed and compound rest.

Although not in the machine tool field, the introduction by Sellers of the Giffard injector into this country in 1860 can hardly be overlooked, since the injector has played an important part in locomotive development.

Previous to 1860, spur-geared, rack-driven planers were made that did not differ greatly from like machines made by other builders at that time, but about 1860 the late William Sellers invented the spiral-geared

planer drive. On August 15, 1862, a patent was granted him for that invention. It was followed by one issued May 17, 1864, protecting certain improvements. In 1862 he patented a belt shifter for the open and cross belts, operated by the action of a cam so proportioned that it would move the receding belt off of the driving pulley before the advancing belt was brought on. In November, 1886, came the frictional escapement feed for planing machines. This device, driven from some portion of the planer having a constant speed, produced a half rotation of the feed mechanism at each end of the stroke, smoothly and without shock. The next development increased the driving power beyond that given by the shifting belt and incidentally it reduced the flywheel action of the high-speed parts subject to reversal of direction. This was especially important

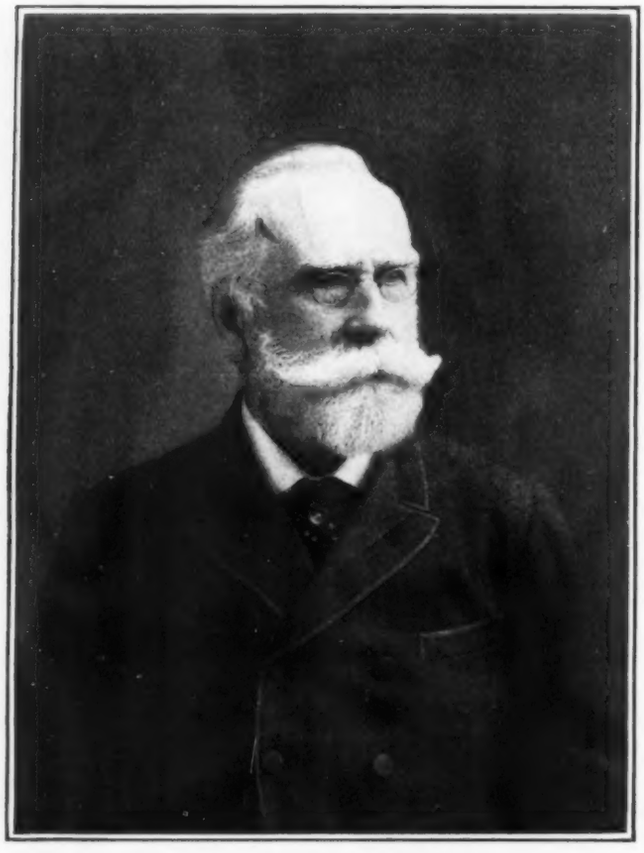


Fig. 2—Dr. Coleman Sellers

because, in the effort to obtain more driving power, higher belt speeds naturally were included. A friction clutch was next substituted for the open and cross shifting belts. Then came the single driving belt, running at the proper speed for returning the planer table and driving the cutting clutch or forward-motion clutch through reducing gears.

Sellers exhibited a very ingenious automatic gear-cutting and dividing machine at the Paris Exhibition of 1867. This machine created a great deal of interest among European mechanical engineers, an entirely automatic machine at that time being a great novelty. The cutter slide had a rapid return by power and, being entirely automatic, one man could run four machines.

Jib cranes were built for the market about 1854, and high-speed, power, traveling cranes in 1883. The introduction of the high-speed, power-traveling crane really constituted an epoch in crane machinery and grew out of certain requirements of the Sellers plant. It was found necessary either to build a new foundry or to increase sufficiently the output of the foundry floor to meet the requirements of its machine shops. There were two usual methods of conveying power to the cranes in use; one by means of an endless rope and the other by a square shaft parallel with the runway. The speed of this shaft was necessarily slow, since the movable bearings were not provided with caps, and supported the shaft only over half its diameter. The firm reluctantly undertook the design of such cranes according to its own ideas and provided them with longitudinal speeds of 100 to 200 ft. per min., transverse speeds of 50 to 100 ft. per minute, and hoisting speeds from 5 to 40 ft. per min. To make these speeds safe and practicable, a capped tumbler-bearing was devised, which held the shaft securely over its entire circumference. Another very important feature was the character of the friction clutches used in operation. The clutches were designed to slip in starting, so that the movements could be brought gradually up to full speed without shock or jar. These two elements, with the superior load brake, made the great success of the Sellers power crane before the introduction of the electric motor.

Such a complete departure from previous practice, necessarily created much comment and this firm was urged to consider building cranes for others, which had not originally been contemplated, and in consequence the traveling-crane business was established, and continued until 1916.

In 1869, machines for grinding drills were introduced and in 1886, machines for grinding cutting tools for the various machine tools used in the firm's own shops.

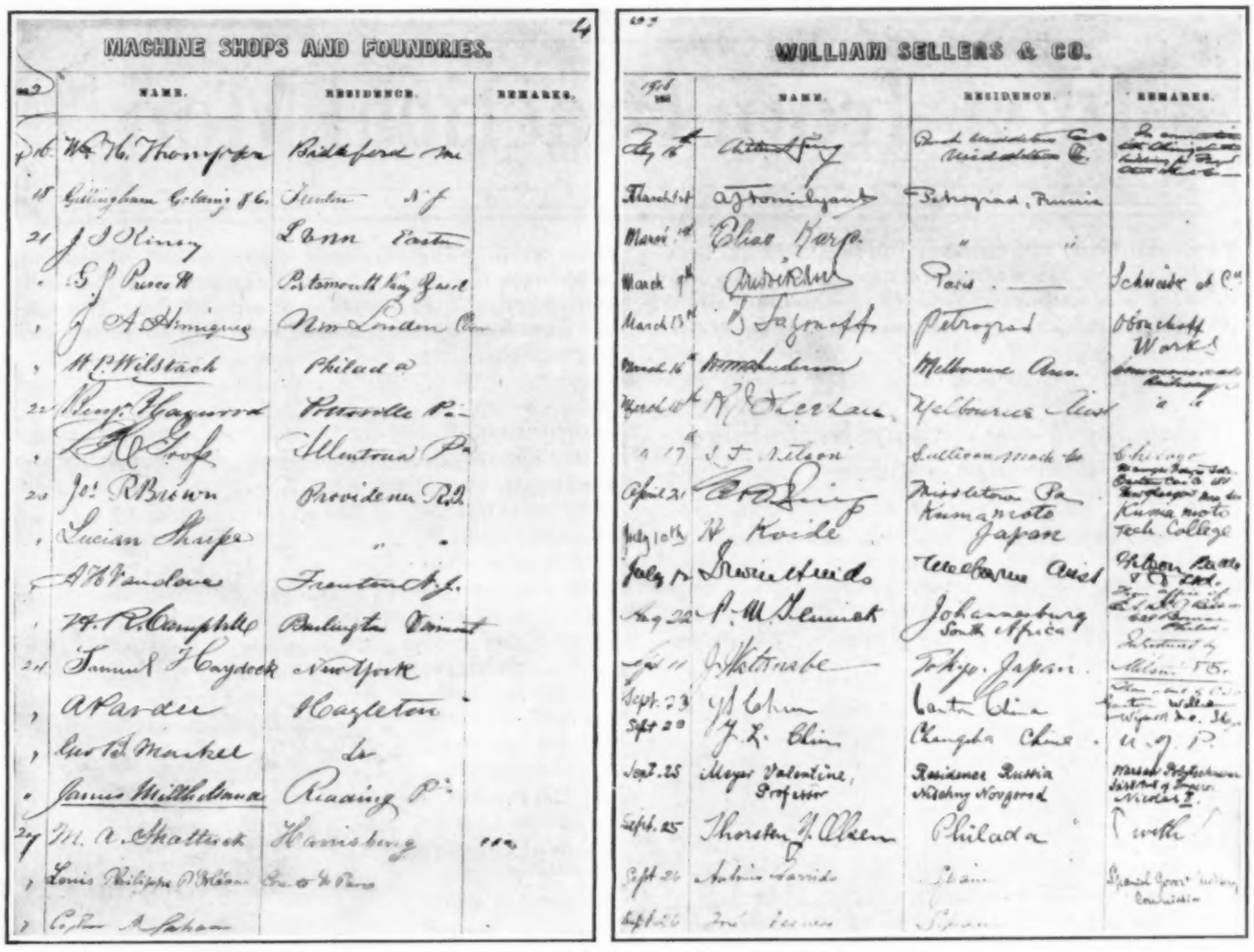
Sellers also built the testing machines on the A. H. Emery principle, beginning in 1891, and furnishing a number of highly successful examples.

On April 21, 1864, Williams Sellers read a paper before the Franklin Institute, proposing a system of screw threads in which the pitch of the thread and its proportions were based on exact formulas. On Dec. 15 of that year, the Franklin Institute recommended the general adoption of the plan. In 1868, a board of engineers appointed by the Secretary of the Navy studied the subject, and on May 15th presented a report recommending the adoption of the "Franklin Institute" standard for the Navy Department. This recommendation was subsequently adopted by the Bureaus of the Navy Department, the War Department and by the railways of the United States. It became known as the "Sellers" system of screw threads, and was the basis of the present United States Standard screw thread system.

Original Designs of Early Machine Tools

The early builders of machine tools, including Sellers, based their designs largely on architectural forms of approved styles with which they were familiar, and in consequence there were Egyptian, Greek and Gothic shapes in machine tool construction, with more or less elaborate molding, fluting, beading and sharp corners which held dirt, and the painting was in vivid colors with stripes, panels, and so forth.

It is believed that Wm. Sellers & Co., were the first in this country to abandon architectural shapes in machine tools, and to substitute original designs of simple form, but adapted purely for the purpose intended. Great attention, however, was given to making the shapes graceful, smooth and free from dirt-holding


MACHINE SHOPS AND FOUNDRIES.

	NAME.	RESIDENCE.	REMARKS.
	Wm. H. Thompson	Biddeford Me	
	Gillingham Colonel & C.	Trenton N J	
	J. J. Kinney	Penn Pa	
	G. J. Pierce M	Portsmouth Eng.	
	J. A. Hinsigus	New London Conn	
	W. C. Wilstach	Philad a	
	Benj. Hazzard	Pottsville Pa	
	H. Gross	Allentown Pa	
	Jno. R. Brown	Providence R.I.	
	Lucian Sharpe	"	
	A. H. Vandusen	Trenton N.J.	
	W. P. Campbell	Burlington Vermont	
	Samuel J. Caydock	New York	
	A. Pardee	Hazleton	
	Geo. W. Markel	do	
	James Millholland	Reading Pa	
	M. A. Shattuck	Harrisburg	
	Louis Philippe Wilson	Co. of St Paris	
	Coston A. Latham		

WILLIAM SELLERS & CO.

	NAME.	RESIDENCE.	REMARKS.
	Alexander Ferry	Russian Legation	
	A. Tromilyard	Petrograd, Russia	
	Elias Harpe	" "	
	Frederick	Paris	Schwacke & Co.
	S. Jagoroff	Petrograd	Obouchoff Works
	[illegible]	Melbourne Aus.	
	W. P. Keelan	Melbourne Aust	
	J. F. Nelson	Sullivan Mach. Co	Chicago
	[illegible]	Mississippi Pa	Kuma moto Japan
	[illegible]	Kuma moto Japan	Kuma moto Tech. College
	Lewis Reed	Tokio Japan	Nelson Valve Co.
	P. M. Lemmer	Johannesburg South Africa	
	[illegible]	Tokyo, Japan	Nelson Valve Co.
	[illegible]	Canton China	
	[illegible]	Chungka China	U. S. N.
	Meyer Valentine, Professor	Residence Russia Nishny Novgorod	
	Thorsten [illegible]	Philad a	
	[illegible]	[illegible]	
	[illegible]	[illegible]	

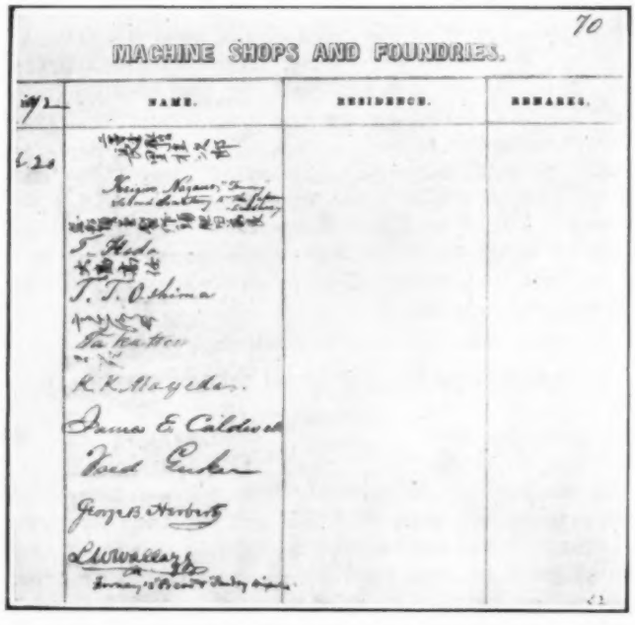
Fig. 3—Two pages of the visitors' register

elements, and it is also believed this firm was the first to introduce the practice of painting machinery a simple, dark gray-blue.

The Sellers organization has always been noted for the originality of its designs and readiness to depart from precedent, if results seemed to warrant it. An example of this is the introduction of the movable upright for wheel presses (1862), using one abutment both for putting trackwheels on the axle and taking them off. Another instance was the Sellers bolt cutter (1857), a radical departure in threading machines.

Sellers began furnishing machine tools to the Pennsylvania Railroad in 1850, to South American countries in 1857, to Russia in 1859 and to Spain in 1861.

The company has one possession which it values highly, and, as far as can be learned after frequent inquiry of many visitors, one that is most unique, namely a record of prominent visitors to its establishment since November, 1861. This record, three pages of which are shown in Figs. 3 and 4, contains the autographs of probably all the prominent engineers of the United States in that period, as well as the autographs of many equally prominent men from abroad, very many of whom have now passed away, but there is no country in the world of any consequence that is not recorded in its pages.


MACHINE SHOPS AND FOUNDRIES.

	NAME.	RESIDENCE.	REMARKS.
	[illegible]		
	T. Ando		
	T. T. Oshima		
	[illegible]		
	R. K. Mayeda		
	James E. Caldwell		
	Fred Ecker		
	George B. Norris		
	[illegible]		

Fig. 4—Another page of the visitors' register

This article would not be complete without special reference to Justus H. Schwacke, the president. To but few men is given the privilege and the distinction of looking back over three score years of activity in the machine tool industry, and in a single shop. Mr. Schwacke came to Sellers on July 15, 1862, as a boy of 14, determined to go into the shop and learn the machinist's trade. But the only opening was for an office boy and he took it and grew up with the business.

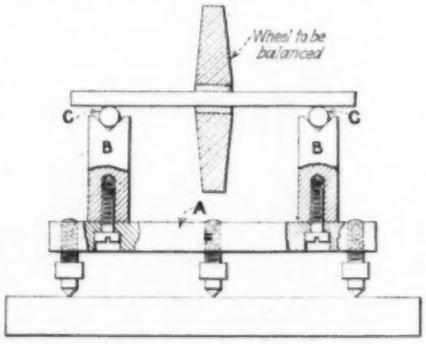
Ideas from Practical Men

The department, "Ideas from Practical Men," is devoted to the exchange of information on methods useful to the machinery industries. Its scope includes all divisions of the machine building industry, from drafting room to shipping platform. Descriptions of methods or devices that have proved their value are carefully considered, and those published are paid for. The rates are from five dollars upward, according to their merit

Balancing-Ways Without Knife-Edges

By Charles Kugler

The writer was at one time employed in a factory where abrasive wheels were made and there became familiar with the type of balancing ways shown in the accompanying illustration, which long ago superseded the common knife-edge type formerly used for the purpose of balancing the wheels. This device I believe to be much superior in principle, for the reason that there are no sharp edges to wear or become broken in service.



Balancing-ways without knife-edges

The device consists of a cast-iron base *A* with three screws by which it may be leveled readily; two parallel pieces *BB* of cast iron with a V-shaped groove planed along the upper edge of each; and two parallel mandrels *CC* of steel, hardened and ground.

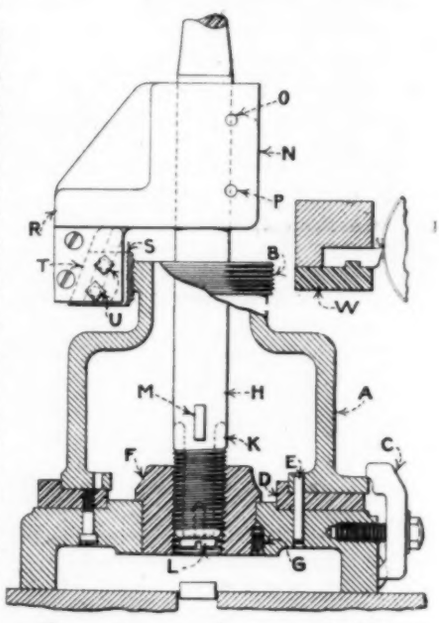
The device is set up in any convenient place where it will be free from vibration, and is leveled accurately. The mandrel on which the wheel or other part to be balanced is mounted, is laid upon the steel mandrels, and allowed to roll in the usual manner until the heavy side is located and the unbalanced condition corrected.

I have seen this device used by men without previous experience, to balance hundreds of wheels daily, and who found no difficulty in using it. Its accuracy is maintained over long periods of service; which is more than can be claimed for knife-edge balancing ways.

Cutting Outside Threads in a Drill Press

By Frank Waldo

When a small quantity of work is to be produced requiring outside threading and no die-head is available for the operation, a simple tool can be made for use on a drilling machine. The work *A* is to be threaded at *B*, as shown in the illustration. The fixture is provided with clamps *C* for holding the work, while the locating plate *D*, provided with three studs *E*, locates the work and prevents it from turning under pressure of the cut. The fixture is also provided with the hardened nut *F*, having threads corresponding in lead with those required on the work. The nut is held in position by the setscrew *G*. The driving bar *H* is provided with the short leadscrew *K*, made in a shell form, fitting over the end of the driving bar and held securely in position by the screw *L* and key *M*. On the upper end of the driving bar, the bracket *N* is fastened by means of two pins *O* and *P*. The bracket has a projecting portion *R* machined to accommodate the chaser *S*, which is backed up on the angular surface *T* and held securely by setscrews *U*, located in the steel plate *W*, shown in the sectional view at the right of the main illustration.



Threading work in a drilling machine

In operation, the work is set in the fixture and the spindle is brought down so that the lead screw enters the bushing. As the spindle is drawn down, the chaser generates the thread on the work. The drilling machine should be equipped with a reversing attachment and should run at a slow speed in order to obtain a good thread. Adjustment for diameter of thread can be made by loosening the setscrews which hold the chaser in position, and moving it up or down according to the adjustment required.

A Trepanning Tool for Wood —Discussion

By W. V. Allen

In reading the article by J. A. Long, under the title given above, on page 403, Vol. 62, of the *American Machinist*, I was considerably puzzled as to why anyone should go to so much trouble to make a trepanning tool for cutting rounds out of thin wood. Each tool such as Mr. Long describes, takes a lot of time to make and

IDEAS FROM PRACTICAL MEN

will cut but one size, necessitating a number of tools for cutting the various sized disks almost every pattern-maker has use for.

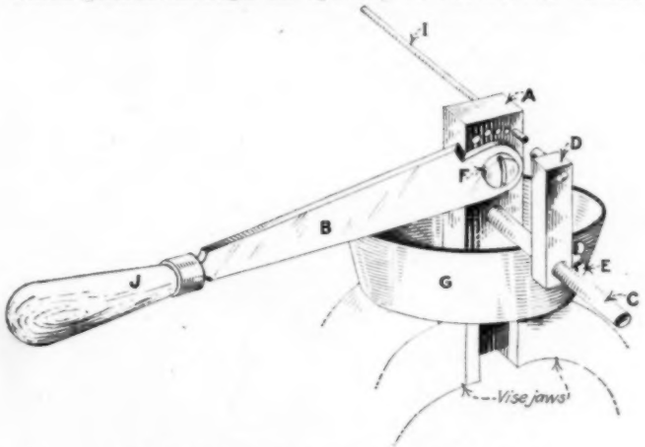
I can buy a forged-steel washer cutter for about fifty cents and it will cut any size disk up to 6 in. in diameter. If I want to cut larger disks I can easily make a longer sweep out of a piece of ¼-in. square steel. Even if made of iron it will do for a few cuts. Such a tool may be used in an ordinary brace, or in a drilling machine. If neither is available a very satisfactory job may be done by using a tap wrench to turn it with, or a handle may be made of a piece of flat iron with a square hole in the middle of it.

On very thin wood, the cutter should be ground or filed so as to form a sloping bevel or rounded edge. If filed in this way, there will be little or no tendency to "buckle" or tear the thinnest wood, provided the workman uses just ordinary care and judgment. If it is desirable not to have a center mark show on the disk, it is easy to temporarily stick a small piece of soft wood in the center for the tool to turn on. If this places the cutting edge too high, the sweep may be bent downward enough to bring the cutting edge where it will work properly.

A Simple Wire Cutter

By S. W. Brown

The illustration shows a device for cutting off pins from long lengths of wire. It consists of the block *A;* cutter *B;* stop rod *C;* adjustable stop *D*, fitted with a stop pin; thumb screw *E;* shouldered screw *F*, and pan *G* for holding the pins. In operation, the device is held in a bench vise by the lower end of the block *A*, which passes through an opening in the bottom of the



A handy device for cutting wire pins

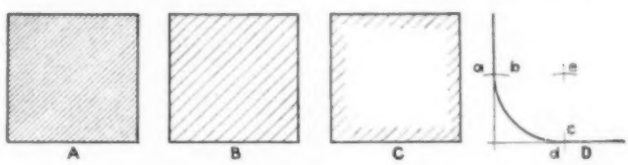
pan. The length of pin is obtained by loosening thumb screw *E* and setting stop *D* the correct distance from the face of the block *A*, with the stop pin opposite the hole required. The wire *I* is passed through the required hole in block *A* and against the stop pin. Raising the lever *J*, cuts off the pin. The holes in block *A* may be five or six in number to suit different sizes of wire. If more holes are desired, a double row would be quite feasible. The device designed by the writer has five holes from 1/32 to ¼ in. by sixty-fourths.

Saving Time on the Drawing Board

By C. L. Hall

There are a multitude of section liners on the market for the draftsman's use, and every once in a while some chap comes across with a new scheme for drawing lines, but I wonder how many draftsmen realize the amount of time they waste in covering the drawing with a maze of lines when they draw a sectional view of some machine part.

In the first place most draftsmen make the mistake of drawing too many lines, or in other words spacing the lines too closely, as at *A* in the sketch. It not



Some ways of wasting and saving time

only takes more time to draw more lines, but the closer the lines are spaced the more apparent becomes any error in the spacing and the draftsman naturally takes more time to make a good-looking job.

If section lines are spaced farther apart, as at *B*, the idea will be conveyed just as well and the drawing will present an equally neat appearance as if the lines were closely spaced. Minute errors in spacing are not so noticeable as when the lines are close together.

The average draftsman is usually a fair freehand artist but he seldom does much drawing without the aid of the straight-edge. Much time can be saved if the section lining is sketched in freehand on the pencil drawings with short lines, like *C*, by the layout man. Let the tracer use the straight-edge and make a neat-looking job of the finished drawing. His time may not be so valuable.

The first thought may be that an otherwise neat drawing would be converted into a sketchy looking "mess" by the addition of freehand section lines, but it is surprising how little the freehand effect is noticed in the general appearance of the drawing, and the time saved is considerable.

Small fillets and round corners can be drawn freehand or with a templet instead of the compasses and if a fair degree of skill is acquired in the freehand use of the pencil, one needs a microscope to distinguish the work from that done with the compasses.

The champion time-waster of my acquaintance used to draw his round corners in the manner shown at *D*. He would extend the two lines lightly until they intersected, and with the intersecting point as a center and the compass set to the radius of the required fillet he would scribe the arcs *ab* and *cd*, intersecting the lines. With these intersecting points as centers he would scribe two more arcs to intersect at point *e*, where he would finally set the compass to draw the radius he was after from the beginning. Of course it was all very nice, geometrically correct, etc.; but imagine the time this fellow spent doing this all over a drawing, even down to radii of 1/32 of an inch. I don't know where he is working now!

Practical Shop Problems

Questions of a Practical Nature will be answered in these columns

Cutting Compounds

Q. Please inform me as to what kind of lubricating oil and cutting compounds are used for bolt threading, nut tapping, on milling cutters, lathe tools and drills.

A. The best oil for this purpose is a pure winter-strained lard oil but on account of its prohibitive cost a mineral lard oil is sometimes used which consists of a small proportion of pure lard oil mixed with less expensive mineral oils.

The general practice, however, is toward the use of cutting compounds or lubricants which are made by a number of companies specializing in the business. Care should be exercised in judging the reliability of the source for the oil or compound and in investigating carefully for any tendency of a given make to affect the hands of the workers. Certain grades will be entirely free from this tendency, others may produce serious results.

Marketing an Invention

Q. I have invented a milling attachment for a lathe. Could such an attachment be patented, or could the idea be sold to a lathe manufacturer? Would it be of much value?

A. It would be impossible for us to advise you as to the sale value of your invention without seeing the device or a complete set of drawings of it. As to whether or not the device can be patented is a matter for a patent attorney to decide after he has made a search of the patent records for interferences.

If you will make a drawing of your device, date it, sign it and have it witnessed by two or three disinterested persons before a notary public, you can submit copies to some of the lathe builders without prejudicing your claims to the invention.

Shrinkage of Metals and Alloys

Q. Can you tell me the amount of shrinkage per foot in steel castings, malleable-iron castings, white-metal castings, gray-iron castings, bronze castings and brass castings?

A. The shrinkage of various metals and alloys is dependent in some degree upon the size and shape of the castings, and in alloys upon the proportions of the various elements also, so that no absolute amounts can be given.

According to various authorities, the approximate shrinkage of the metals named is as follows:

Steel castings,	$\frac{1}{16}$ to $\frac{1}{4}$	in.	per	foot
Malleable-iron castings,	$\frac{1}{8}$	"	"	"
Gray-iron castings,	$\frac{1}{32}$ to $\frac{1}{8}$	"	"	"
Bronze castings,	$\frac{1}{32}$ to $\frac{1}{16}$	"	"	"
Yellow-brass castings,	$\frac{1}{16}$ to $\frac{1}{4}$	"	"	"

Since white metal may be of various combinations, we cannot give its approximate shrinkage.

The Capacity of a Screw Press

Q. We have built a screw press for use in our shop. Please tell us how to figure out the capacity in tons.

A. The force exerted at the handwheel in pounds, or on the end of the turning lever, multiplied by the distance in inches which the handwheel moves and divided by the corresponding distance in inches through which the ram moves will, neglecting friction and possible frame distortion, give the pressure in pounds resulting at the ram. This figure divided by 2,000 will be the ton capacity.

It will often be found in such machines, particularly those which are built "at home," that the force available at the ram is considerably in excess of the capacities of bearings, anchors, frame members, table supports or of the ram acting as a column. Each one of these points should therefore be investigated, using the regular formulas for strength of materials. The use of the machine should then be limited to the safe load for the weakest member.

Screw presses built by companies that specialize in this type of shop equipment can be provided with pressure gages in the ram which will tell the pressure that is being exerted at all times. They can also be provided with throw-out clutches that may be set at a predetermined point.

Proportioning Quick-Change Gears

Q. In the design of lathes or thread-cutting tools kindly advise a formula for figuring the gear changes for quick-change thread indexing.

A. The calculation for change gears for screw cutting is the same for quick-change gears as for change gears used in the ordinary way, the principal difference in arrangement being that the gear on the spindle is not changed and all the gears for the quick change are mounted on one shaft.

The *American Machinists'* Handbook gives the information desired in the chapter on screw threads, where explanation is made and a summary of the rules are set down in the form of a concise table.

Machining Bronze

Q. We have had trouble in machining a quantity of bronze pump valves which we desire to true up after a period of use. The tools dulled rapidly and would not give a good finish. Please advise us what we should do.

A. There are certain bronzes, used as material for pump valves that, on account of their composition and resulting structure, offer great resistance to wear under the continuous pounding to which they are subjected. You may have one of these bronzes and it is necessary to grind your tools and use the speeds proper for cutting soft steel. The tools will then stand up and the finish will be quite satisfactory.

Technical Abstracts

Future Oil Reserves

C. A. Fisher, consulting geologist, of Denver, gives a paper worthy of study by the automotive industry, in which he discusses the question of our gasoline reserve supply. Alcohol is not a complete substitute for gasoline because its power output per gallon is only 5/9 that of gasoline, and further its different nature of combustion would require a complete change in design in the engine. Even with this practically the entire molasses production of the world, plus the corn crop of 200,000,000 bu. plus the available waste wood of the country, plus the "sulphite liquor" if all converted into alcohol would only give 900,000,000 gal., or about 10 per cent of the total production of gasoline in the United States for 1924. Benzol, another possible fuel would only yield 200,000,000 gal. per year, made from 60 per cent of all the coke in the United States and from the illuminating gas plants equipped with recovery systems. So the total amount of motor fuel, exclusive of that derived from petroleum, which can be produced by the above estimates would only be 18 per cent of the 1924 gasoline production. These estimates are very liberal.

However, recent estimates prepared by the American Petroleum Institute show a potential reserve of oil contained within the lignite, subbituminous and bituminous coal of the United States to aggregate practically one hundred billion barrels. This will supply a product which will be in character and kind similar to our present gasoline and lubricating oil. Another source is found in the oil shales of the United States. The Scottish shale oil industry was started in 1847 on a commercial basis and at the present time is retorting around 1,000 tons of shale a day. A commercial plant is in operation in Sweden. The Japanese government has been investigating the methods used in Scotland and the United States and now contemplates the erection of a 2,000-ton shale oil plant at Fushun, in Manchuria. Similar steps are being taken for the development of this industry in a dozen other countries. In this country oil shale is found in twenty-five different states, the most important being, Colorado, Utah, Wyoming, Nevada, California, Oregon, Texas, Kentucky, Indiana and Ohio.

Summarizing, shale is a known source of supply of petroleum which will be regarded not only as a source from which to supplement the future supply of ground well oil, but as a source with such an enormous potential possibility that it can gradually replace our present supply should that become necessary. — *National Petroleum News*, April, p. 33.

Drilling Cash Register Parts

The National Cash Register Co. has two departments called the drilling divisions; the first department employs men and the other employs women. The method of drilling and reaming register keys is described and illustrated in this article by L. S. Love. The method formerly in use was the employment of two two-spindle sensitive drills on which work was turned out at the rate of 2,200 pieces per operator per day. Two operators were needed to produce the required output by this method. By the development of a special machine one operator produced 4,500 drilled and reamed keys per day. The machine is equipped with two groups of four spindles each. One group drills, the other reams. The table of the machine has three stations, the first being the loading station, the second the drilling station and the third the reaming station. The fixture at the loading station, when unloaded, is cleaned free of chips, prior to reloading, by a blast from an air hose. Another operation is the use of a cluster head multiple drill on a small brass casting. It was formerly the practice to use two six-spindle sensitive drills for the various drilling and reaming operations, two operators being required. Now one man operates this cluster head drill and does the work, cutting the labor item in half. The cluster head is arranged with the spindles in two groups, drilling and reaming in two strokes of the machine.

The article also describes the engraving machine, which replaced a high-priced man who took a day to do work now done in two hours.— *The Iron Age*, April 16, p. 1113.

The Loss Due to Labor Turnover

Harold Fischer writes on the great economic loss we are suffering due to workmen moving from job to job. In order to maintain in the United States a working force of 40,000,000, it is estimated that 50,000,000 workers are hired annually. In other words, there is an average turnover of about 125 per cent. This turnover is not a complete loss, as many changes are made for the purpose of advancement. In reply to a questionnaire it developed that some employers think the cost of labor turnover is the cost of the employment department but these employers fail to take into consideration the items of decrease in production, cost of instruction, breakage and damage caused by new men, accidents to workers, waste or destruction of material, delay of work or stoppage of machines and the cost of idle machinery and equipment, all of which are directly traceable to the hiring or firing of men. Other employers have only a vague idea of this.

Mr. Fischer has selected ten factories making diversified products, the largest having 15,000 employees on its payroll, and the smallest having little over 300. From these he estimates that $50 would fairly represent the average replacement cost per man in American industry as a whole. In other words, as 32,985 persons were unnecessarily employed in these ten factories, an approximate loss of $1,649,250 was thereby entailed. The estimated economic loss in the whole United States due to labor turnover can be therefore placed as around one billion and a half dollars annually. There are statistical illustrations accompanying this article.—*Industry Illustrated*, April, p. 22.

American Machinist

Established 1877

KENNETH H. CONDIT AND FRED H. COLVIN, *Editors*

Help Milling Cutter Simplification

THE Division of Simplified Practice of the Department of Commerce is sending blanks to users and makers of milling cutters on which they can signify their willingness to accept and further the simplifications proposed at the Washington meeting of March 25, 1925. This is the first step toward making the new lists effective and it is hoped that the response will be as prompt and as hearty as in other lines that have been simplified to the benefit of all concerned.

Those who profess fear of over standardization will be relieved if they study the method being pursued by the Department of Commerce. There is no attempt to enforce arbitrary rulings; it is desired merely to get manufacturers and users together so that unnecessary numbers of sizes or parts can be eliminated. Such a movement benefits all concerned, the maker, the jobber, the retailer and the ultimate consumer. Simplification avoids the necessity of tying up capital in seldom-used tools or other products.

Fostering or Retarding Aviation?

THERE seem to be different ideas as to what "fostering" means. The War Department seems to have a definition all its own. After asking for further appropriations on the claim that it is fostering commercial aviation, it issues drastic orders that no aircraft operated for profit, can use an active Government airdrome under any circumstances. While it is hardly likely that a commercial pilot would be shot at sunrise if he used an army field for a cross-country landing, an officer of the martinet type who never tempers orders with judgment, could do about as he pleased and be within the new orders unless the pilot could prove that it was an emergency.

If you are not flying for profit you may be permitted to use an army flying field if you have taken the precaution to first get the permission of the C.O. and put up a bond for $5,000 to protect government property from damage. If you have neglected this little formality, you had better pick out a field of wheat or grass and take your chances of settling with the farmer afterward, unless you can prove a necessary landing.

In reality there is no desire to prevent emergency landings on army fields when life or planes are in danger, but the wording of the rules and the attitude toward commercial flying can hardly be called fostering aviation.

Government property should, of course, be protected, but in localities without public landing fields, the army field might well be utilized under suitable restrictions. The more commercial aviation is developed, the less the army will have to pay for planes and accessories. If the army can get a revenue from the flying fields, it can have so much more to spend for aviation.

The Golden Rule in Business

THERE is a tendency in many shops, among them some of the largest in the country, to make specific use of the Golden Rule in business. This was particularly noticeable at the Spring Convention of the Society of Industrial Engineers where at least three leading speakers from large companies seemed to foreswear the scientific aspect of personnel problems and handled their subject entirely from the standpoint of "Do unto others as you would have them do unto you," or, in brief, from the emotional aspect.

There is, of course, nothing new in the belief that men should be handled justly and humanely. What does appear to be new, however, is the evidence of trend away from the scientific, impersonal study toward the more concrete human side. Nor can it be said that the speakers were theorists, because all three are practical men engaged in practical personnel work. Does this mean that some of our management specialists are beginning a swing of the pendulum away from the study of man as a machine toward the study of man as a human being?

We believe that there is right on both sides. Man is a mixture of emotionalism and mechanism, and there is definite room for the study of his pyschology from both the emotional and the scientific side.

What About Machine Tool Marketing?

ARE machine tool builders and distributors using every possible up-to-date method in their sales efforts? The reason for the question is found in a brief report from one of our correspondents.

At a recent auction sale of a big plant with all its equipment the dealers in used tools had to keep on the job every minute to secure any bargains at all. Buyers from manufacturing concerns were there eagerly snapping up every good thing that was offered and sometimes paying prices almost equal to the prices of new machines.

Can it be possible that these buyers had been subjected to all of the many sound arguments for purchasing new tools instead of used ones? Or had the salesmen who visited them been simply order-takers waiting for something to drop? Perhaps a little jacking-up is necessary somewhere.

Shop Equipment News

Niles-Bement-Pond Combined Lathe and Grinder, 113-In.

The Niles-Bement-Pond Co., 111 Broadway, New York, N. Y., has completed construction of the machine illustrated in Fig. 1 for turning and grinding the rotors of the mammoth electric generators which are being built in the shops of the General Electric Co. It is the fourth of a series of lathes that has been made necessary by increase in the size of the work beyond the capacity of available equipment.

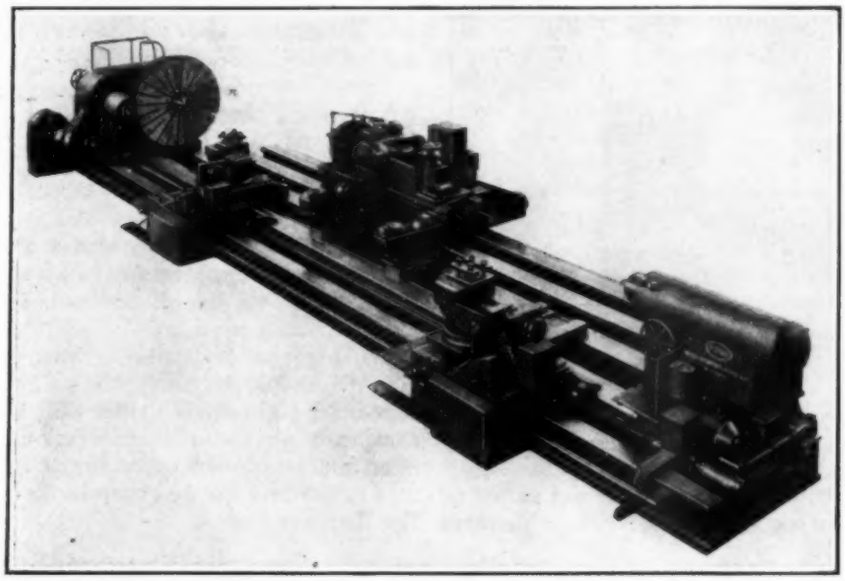


Fig. 1—Niles-Bement-Pond Combined Lathe and Grinder, 113-In.

It will swing 113 in. over the bed and 94 in. over the carriages. Its length capacity is 45 ft. and it has been designed to support a work load of 300,000 pounds. There is a complete Landis grinder carrying a 36-in. wheel mounted on ways at the rear. The bed, which is made up of three main ways and two auxiliary grinder ways, measures 13 ft. and 8 in. in width by 65 ft. in length.

The headstock casting incloses the main spindle and the steel driving gears, spans the three main ways and centers between the middle and rear ones. The movable gears in the driving train are provided with end play and are backed up by heavy springs to facilitate changing the driving ratio when they are manipulated by the hand wheels, illustrated in Fig. 2, located at the ends of their shafts. A 75-hp. adjustable speed d.c. motor furnishes power to drive the 22-inch diameter spindle at a speed range from ¾ to 39 r.p.m. A face plate, 85 in. in diameter by 17 in. in width, is centered over the projecting spindle nose and is bolted to a flange forged integral with the spindle. The centers are 8 in. in diameter.

The rear portion of the tailstock extends over the middle and the rear ways, but is reduced in the front to allow the carriage and the grinder to be brought close to the dead center. The tailstock spindle is 16½ in. in diameter and can be moved by means of a handwheel a distance of approximately 36 inches.

The two carriages are arranged with cross slides and with compound and swivel toolrests. They are designed to pass the steadyrests without interference.

Two independent rests are used to help support the work in the bed, rollers being set in them in a manner to divide the load equally. The steady-rest contains five adjustable jaws with a range of adjustment for work between 12 and 40 in. in diameter. A removable top assists in entering the work.

A stationary lead screw, 5½ in. in diameter, is located between the ways and is supported at intervals by tumbler bearings, and a spline shaft, driven from the head, extends the length of the bed in front of the machine. Independent power movement for the tailstock and the two carriages may be obtained by motor-driven nuts on the lead screw.

The tailstock motor is geared direct while the carriage motors drive through clutches which may be engaged or released on each carriage. By disengaging the clutch from the independent motors and connecting the carriage movement to the spline shaft, power may be derived from the headstock to drive the carriage in relation to the rotation of the main spindle. Change gears mounted in a cabinet on the front of each carriage permit of cutting all the usual thread pitches when the spline-shaft drive is used.

The grinding machine is also individually driven, there being four motors, one for driving the wheel, one to furnish power to the water pump, one to move the grinder on the main ways and one to advance the wheel to the work. There is a sufficient travel to grind bearings 60 in. in length at a given setting, and the whole assembly is arranged so the wheel may be used in any location between the lathe centers. A means is provided to adjust for exact alignment with respect to the lathe axis.

Lubrication is provided by means of multiple oiling units placed to the best advantage.

Push-button control of the various motors has been included to attain a maximum of flexibility in operation and at the same time is interlocked to conform with the principles of safety.

SHOP EQUIPMENT NEWS

Stations to control the direction and speed of rotation are located on both carriages, on the grinder and at the headstock. At each of these main control stations a "safe" button may be set to prevent the motor from being started from any station until the button is released again at the station at which it was set.

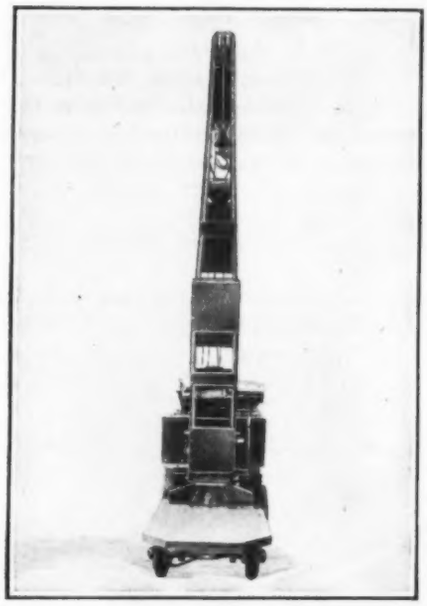
Push-button control is also provided for the individual motors on the carriages and for the main- and water-pump motors on the grinder. On the carriages, they are so connected that it is impossible to start the motor for feeding until the main lathe-driving motor is up to speed and the slow-motion feed gears are engaged. While the feed buttons may be set for continuous feed, another one is provided for rapid motion that must be held in as long as the motion is to be maintained. This rapid-travel button is inoperative as long as the feed gears are in mesh.

The motor that moves the grinder to the work or longitudinally across its main ways and the motor which moves the wheel head, only, to or from the work are provided with reversing drum controllers, as is also the individual motor for moving the tailstock into new positions.

The entire machine is to be set on some sixty wedges which are made in two parts and are adjusted up or down by means of a screw. The purpose is to assist in the initial set-up and to facilitate realignment at any future time.

Elwell-Parker Portable Electric Crane

An improvement to the Elwell-Parker type CK portable electric crane is the telescoping boom illustrated. A long boom is at times a hindrance, while a short one often falls short of a desired range, so to meet this condition, a telescoping boom with four settings, between 12 and 17 ft. is offered.



Elwell-Parker Portable Electric Crane

The boom is all-steel and raised or lowered by a set of cables operated from an electric motor-driven hoist with grooved drums. The side channels are latticed and are gusseted with a ¼-in. steel plate extending through the length of the curved head of the boom. The enveloping section is of formed plate steel, providing a support for the telescoping portion.

A feature of this boom is that the minimum distance from the top of boom to the hook is but 23 in. The battery compartment carrying the hoist unit counterbalances the boom. The load rests on the steel crane column supported on ball and roller bearings. This column is set in a pedestal anchored in the main frame. The boom may be furnished with either hand or motor slew as required. The crane controllers have been redesigned and suitable safety features are incorporated.

National Automatic Tool Co. Purchases Garvin Drilling Machines

The National Automatic Tool Co., Richmond, Ind. has purchased from the former Garvin Machine Co., New York, N. Y., its line of duplex-horizontal drilling machines. This machine, made in six models, Nos. 0, 00S, 1S, 00SS, 1SS and 5, also the four-head right-angle driller will be continued as the regular National line, and all repair parts for those now in the field can be obtained from the Richmond plant.

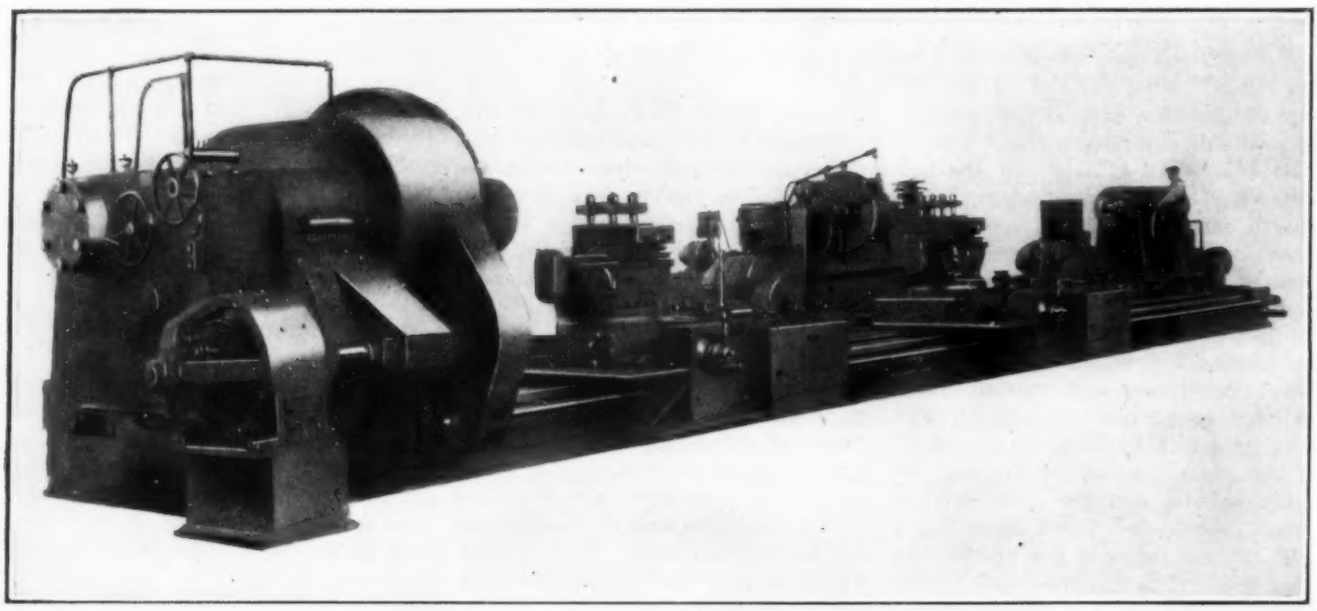


Fig. 2—Front view from headstock end

SHOP EQUIPMENT NEWS

Zeiss Thread-Measuring Instruments

Several thread-measuring devices that have been developed by Carl Zeiss, Jena, Germany, are illustrated, including a screw-thread micrometer caliper, a thread-profile gage, an optical thread caliper and a toolmaker's microscope. The instruments

Fig. 1—Zeiss Screw-Thread Micrometer Caliper

are marketed in this country by Schuchardt & Schutte, 142 Liberty St., New York. They have been produced for the purpose of giving accurate measurement of various thread sizes and requirements.

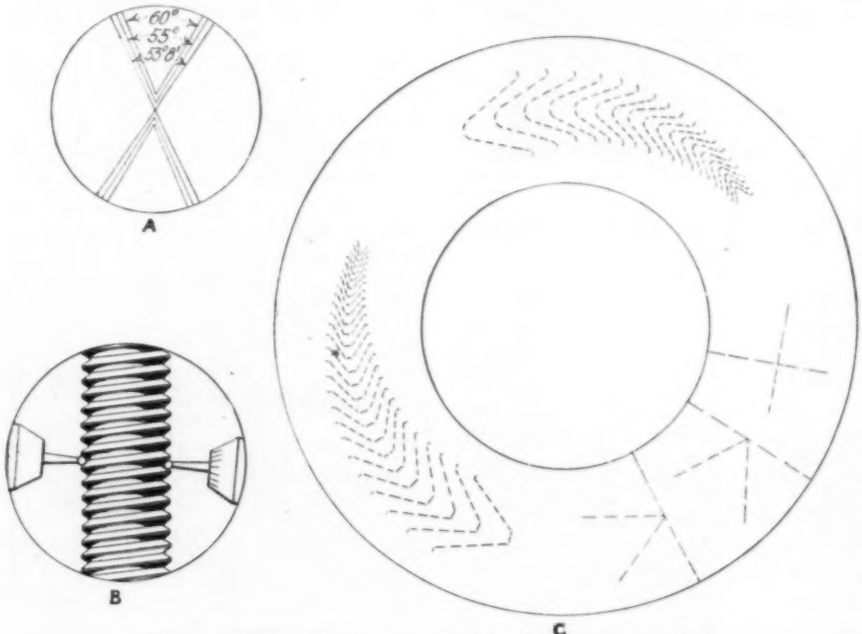


Fig. 3—Examinations made by these instruments

The screw-thread micrometer caliper shown in Fig. 1 is constructed so that various sized measuring points and anvils can be inserted according to requirements. The points and anvils are made to 60 deg. angles and cover a range of 2½ to 64 threads per in. The micrometers are made in four sizes, from 1 to 4 in., for the measuring of threads within their range. They are each packed in a wooden box that has provision for a set of points and anvils.

In Fig. 2 is shown a threading-tool profile gage used for inspecting the cutting point of a threading tool and for determining its relation with the work. The instrument is made with a circular V-block so that it can be applied to a piece of work that is being machined, and positioned so the examining lens comes directly over the threading tool. The bottom portion of the lens has a marked glass, as shown at *A* in Fig. 3, so that the tool can be arranged to a correct cutting position and at the same time can be inspected for the proper angles by lining them up with the lines on the glass. Adjustment of the lens can be made up or down and in or out to suit the work being turned. Center holes are provided in the V-block so that the instrument can be suported between centers if the nature of the work does not permit alignment from its circumference.

The optical thread caliper shown in Fig. 4, used for the inspection of pitch diameters of screws, consists of a stand, optical lens and a ball anvil micrometer. In use, the micrometer is first set by a standard plug gage to a desired size, and the work is then measured to a variation in size of 0.0004 in. For inspecting a quantity of work, two of these gages are used, one for the "go" and the other for the "no go." A full set of ball points are furnished so that all threads falling within the

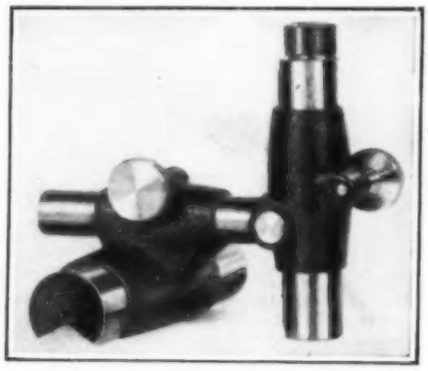


Fig. 2—Zeiss Thread-Profile Gage

capacity of the tool can be measured. These gages are made in two sizes, the smallest have a capacity up to ½ in. and the next size up to 1 in. in diameter. The magnifying unit can be removed from the stand and used for checking work in the lathe or grinding machine. At *B*, Fig. 3, is shown the appearance of the ball points located between threads.

The toolmaker's microscope, Fig. 5, is used for the inspection of threads and threading tools, graduations, formed cutters, ball impressions made by Brinell tests, cracks, flaws and various surfaces. It is possible to check threads individually for angular relation and their position in relation to the axis of the work. An accurate optical templet, the position of which is adjusted to close limits, contains the profile of standard threads, as shown at *C*, Fig. 3. This is located at the upper portion of the magnifying lens and turned by hand until the desired profile is brought into view, at which time it is set to a vernier graduation visible through the glass. The work to be measured is then located either by V-blocks or on centers that are mounted on a compound table provided with a swivel movement. Micrometer adjustments are made to bring the work into the correct position, these being located in the front and right side of the base. The con-

SHOP EQUIPMENT NEWS

tour of the thread, appearing as a sharp deep shadow, is then compared with the outline of the optical dial showing any deviation from the cor-

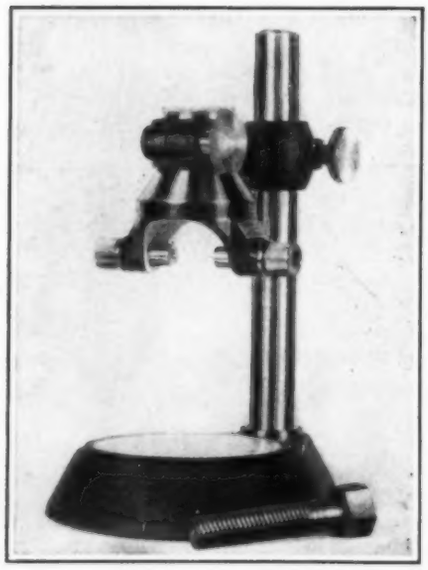


Fig. 4—Zeiss Optical Thread Caliper

rect form, as the glass magnifies 30 times the original size. Light is thrown under the work to be inspected by means of a condenser having an adjustable inlet at the left-

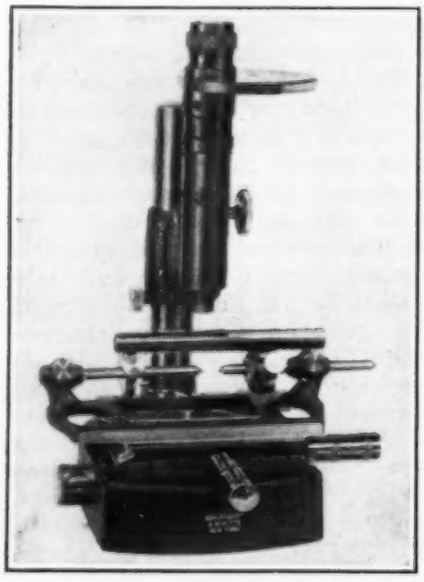


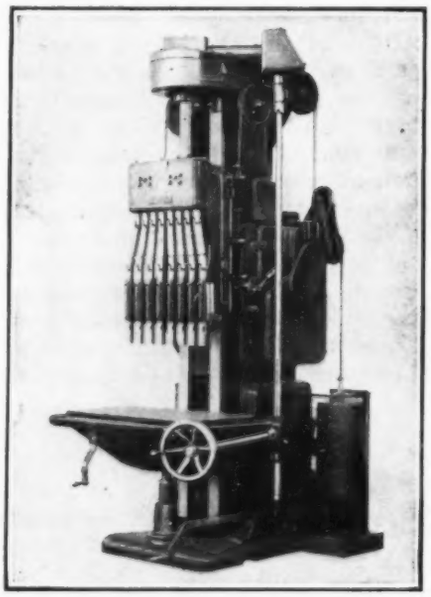
Fig. 5—Zeiss Toolmaker's Micrometers

hand side of the base. The amount of error in pitch lead, the depth of thread and the flat on the top and bottom of thread are noted by micrometer readings.

Defiance Multiple-Spindle, Horizontal Boring Machine, No. 10

The multiple-spindle boring machine illustrated has been brought out by the Defiance Machine Works, Defiance, Ohio. The spindles are provided with a straight-line adjustment, making the machine suitable as a production unit for a variety of multiple-spindle operations.

Eight spindles are arranged in line, fitted with ball-thrust bearings and mounted on a head provided with a counterweight that can be operated either by power or hand feed. The



Defiance Multiple-Sprindle, Horizontal Boring Machine, No. 10

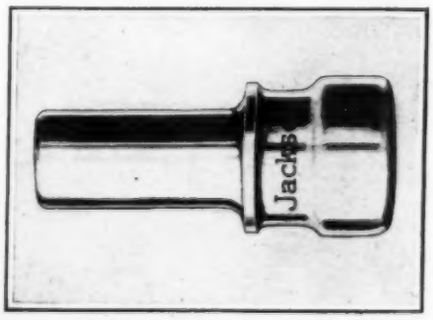
table regularly furnished with this machine is the knee type, 20x36 in., with a vertical adjustment, but, if required, a table of the box-knee type can be substituted. The feed and speed mechanism is of the unit construction, lubricated by a forced feed, a gravity flow and a splash-oiling system combined. The machine is provided with two roller-bearing hangers and a shaft 1 7/16 in. in diameter, 60 in. long, a three-step cone pulley 16, 18 and 20 in. sizes with 4-in. faces and a tight and loose pulley 16 in. in diameter by 6 in. face that runs at 400 r.p.m. Motor-drive attachment can be provided if required, but is not regularly equipped. The back gear ratio is 1 to 2, providing spindle speeds of 110, 137, 172, 220, 275 and 344 r.p.m. Holding fixtures, tools and equipment for cutting lubricants, including pump, tank and pipe, are furnished as special equipment.

The specifications of the machine are capacity, 7/8 in. holes; minimum distance center to center of spindles, 2 in.; maximum distance center to center of spindles, 22 in.; vertical adjustment of collet in spindles, 3 in.; diameter of spindle nose, 1 11/16 in.; Morse taper in spindle, No. 3; maximum distance nose of spindle to base 44 in.; minimum distance, 30 in.; maximum distance nose of spindle to table, 32 in.; vertical travel of spindle head, 14 in.; distance center of spindle to column, 9.970 in.; vertical table adjustment 12 in.; floor space occupied, 57x84 in., and a net weight of 8,315 lb. A drive of 7½ hp. to operate at approximately 1,150 r.p.m. is recommended.

Ingersoll-Rand "Jackset" Alloy-Steel Rivet Set

An increase to the present line of pneumatic tools, manufactured by the Ingersoll-Rand Co., 11 Broadway, New York, N. Y., has been made by the addition of the "Jackset" rivet set, made of a high quality alloy steel.

These tools are forged and hardened so that their application to hot rivets will not cause their temper to become drawn. It is claimed that the delays and losses due to the breaking of carbon rivet sets has been eliminated by the use of a durable material that will increase



Ingersoll-Rand "Jackset" Alloy-Steel Rivet Set

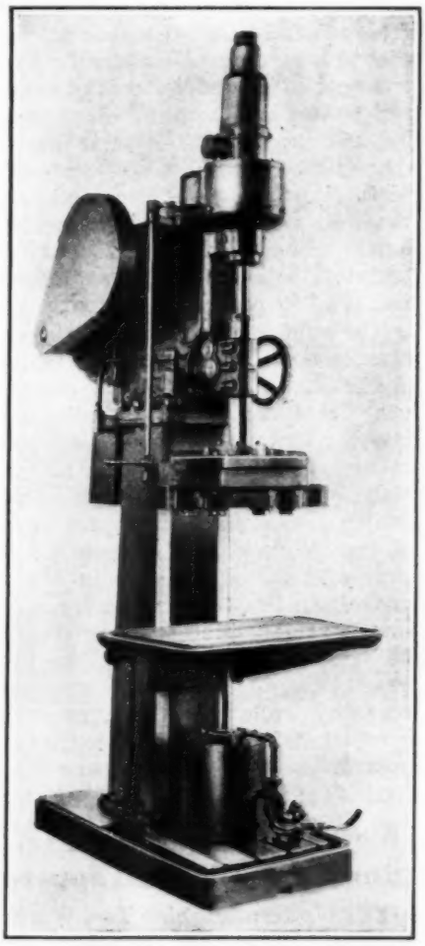
the number of rivets that can be driven in for life of the set. This set is the result of years of experience and of many tests on several steels and heat-treatments, made in the effort to produce a tool to withstand the stresses of riveting service.

SHOP EQUIPMENT NEWS

Barnes Honing Machine No. 211

For the honing of gasoline-engine cylinders as a final means of finish, the Barnes Drill Co., 830 Chestnut St., Rockford, Ill., has brought out the machine illustrated, capable of producing a smooth bearing and removing high spots in approximately 1½ minutes. The machine is a modified form of the No. 210 self-oiling, all-geared drilling and tapping machine manufactured by this company.

The work is mounted on the machine so that all cylinders are honed simultaneously by a honing stone attached to each spindle of the multiple head. The amount of material



Barnes Honing Machine, No. 211

that is removed is approximately 0.001 to 0.0015 in. The spindle carries a cam positioned above a cross gear that operates a rotary ball-cam roller in a counter clockwise direction, while the six-splined spindle rotates clockwise. The ratio of one to the other may be arranged to suit. Assuming that the roller runs 50 r.p.m. and the spindle 100 r.p.m., there would be 150 reciprocations of the spindle per minute. The cam furnished gives a 5-in. stroke, but a greater or smaller movement can be provided if required, and likewise speeds may be geared to suit. The shape of the cam can be cut to a desired stroke, but as regularly supplied, there is no dwell at either top or bottom.

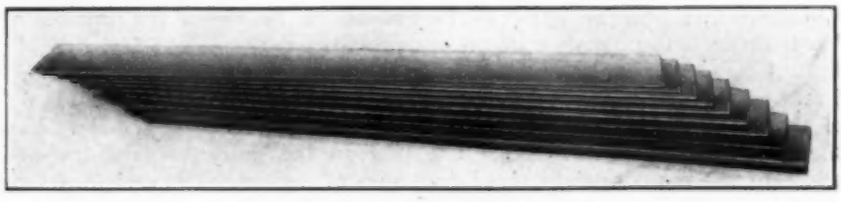
The table is air operated and has a total movement of 10 in. for the easy removal of the work. Silent-chain motor drive, directly connected to the machine, is provided. A six-spline spindle operates in a broached cast-iron hub from the steel-crown gear, this being self-oiled to accommodate rapid reciprocations. This machine is self-oiling, all-geared and ball-bearing construction. It is claimed that the surface lines left on the cylinders by this operation are entirely removed in six hours of dynamometer tests and that the honing process eliminates inequalities that are found in other methods.

Brown & Sharpe Ground Flat Stock

Several additional sizes have been added to the ground flat stock marketed by the Brown & Sharpe Manufacturing Co., Providence, R. I. This stock is made of tool steel, uniformly annealed, and ground to a tolerance of a thousandth of an inch.

There are twelve thicknesses furnished, 1/64, 1/32, 3/64, 1/16, 5/64, 3/32, 7/64, 1/8, 9/64, 5/32, 11/64, 3/16 and 1/4 in., all of these being made in various widths and 18 in. in length. Square sizes are also obtainable in six sizes up to 1-in. square.

This flat stock is adapted to the making of punches, templates, machine parts, gages, test tools and many other special parts that require an accurate thickness.

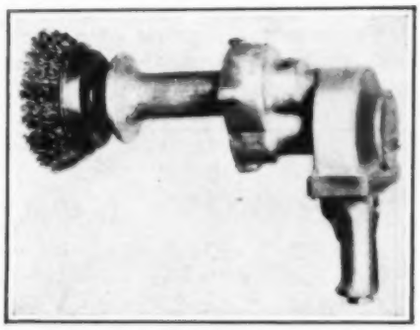


Brown & Sharpe Ground Flat Stock

Standard Air-Turbine Motor

The air-turbine motor illustrated has been developed by the Standard Turbine Corporation, Scio, N. Y., for use in connection with wire brushes, making its application suitable for the scaling of ships, the cleaning of steel blooms in rolling mills, of castings in the foundry and similar operations.

The pneumatic motor is simple in construction, having only fifteen



Standard Air-Turbine Motor

parts, exclusive of the screws. The unit consists of a turbine wheel that operates at a speed of 12,000 to 18,000 r.p.m., mounted on ball bearings and geared by a single or double reduction to the low-speed shaft carrying the wire brush. This shaft runs in a sleeve bearing and is provided with a ball-thrust bearing to take the end pressure.

The turbine wheel is made of forged steel, tested to 100,000 r.p.m., and is operated at will by air pressure that is controlled by a hand-operated trigger. The exhaust of the air is made through the low-speed shaft, so that it assists in keeping the brush clean. An all-aluminum casing is used to keep the weight as light as possible and yet maintain a suitable strength. The total weight of the unit is 11 pounds.

It is claimed that this motor is lighter in weight than the reciprocating type of equivalent power and is practically free from vibration.

SHOP EQUIPMENT NEWS

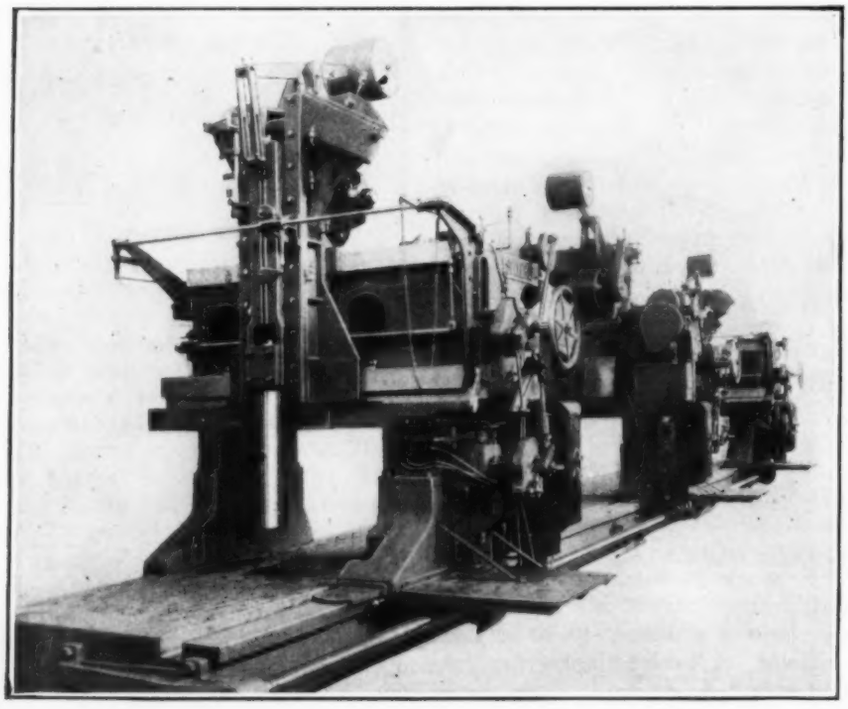
Sellers Triple-Head Locomotive-Frame Slotting Machine

To meet the demand for a slotting machine for the increasing sizes of locomotives, the William Sellers Co., Inc., Philadelphia, Pa., has developed the machine illustrated, that incorporates some of the features of the smaller sized slotting machines manufactured by this company in addition to the spiral-pinion planer-drive mechanism and reversing-planer motor-control aparatus.

The machine consists of a heavy bed that supports three slotting heads. These heads are operated by revolving nuts and a single screw extending along one side of the bed that is approximately 60 ft. long. This screw is stationary and is provided with tumbler bearings that automatically move out of the way as the head approaches. Each head consists of a cross-rail, supported on two uprights, that is 3 ft. 10 in. from top to bottom with a depth of 3 ft. 5½ in. at the lower end and 2 ft. 5½ in. at the top. The uprights of the crosshead have a bearing on the bed of 6 ft. 6 in. in length. The width of the main upright, used for guiding, is 16 in. and the width of the other is 10 in. The uprights are 5 ft. apart, giving ample clearance on each side for the largest locomotive frames made. The height under the cross-rail is 42 in. and is sufficient to allow four 9-in. frames to be slotted at one setting. The cross-rails may be swiveled to 6 deg. each side for the angular surfaces of the frames. A saddle is mounted on each cross-rail and provided with 5 ft. 3 in. of travel, and adjustable taper gibs to take up wear between the saddle and the rail.

A spiral-pinion planer drive is employed to operate the slotting bar. The driving shaft is actuated from the reversing motor through two pairs of gears. Variations in speed of the slotting bar are obtained by varying the motor speed with field rheostats. Cutting speeds of 25 to 50 ft. per minute and return speeds of 50 ft. to 75 ft. per minute are provided.

The ram, made of box section 8 in.x15 in. outside dimensions, is 6 ft. long so that there is sufficient bearing in the guide to take the pressure of the cut. The ram is counterweighted and provided with a forged steel rack 5 in. wide. The length of the guide for the ram is 7 ft., 6 inches.



Sellers Triple-Head Locomotive-Frame Slotting Machine

Each head is provided with an electric feed mechanism that gives easy adjustment and accurate timing. It is set to take the minimum amount of stroke to perform the feed. Feeds of $\frac{1}{64}$ in. to $\frac{1}{4}$ in. are provided in small increments. At the end of each stroke, the feed motor that is connected to the feed disks, is run until it has driven the disks 180 deg.

The feed motor is started at each end of the stroke of the ram, and as it only requires a few seconds to move the disk, it is arranged to start just before the end of the stroke, and divide the time of operation between the two strokes. This reduces to a minimum, the amount of stroke required for feed. Moving of the feed disk operates the crank and ratchet from which both motions are set for the proper amount of feed. The traverse of the saddles on the cross-rail and of the cross-rail on the bed are obtained with the same motor that is used for the feed. This adjustment enables the operator to set the tools closely without the use of hand adjustment. The speed of travel of both the saddle and cross-rail is 4½ ft. per minute.

The ram is provided with a mechanical knockout at each end of the stroke that disconnects the driving gear from the ram and applies the brake. This protection is desirable in case the operator fails to set the stop properly. There are limit switches at either end of the travel of the saddle on the cross-rail that prevent feeding too far in either direction. The feed and traverse are interlocked so that traverse cannot be started with the feed clutch engaged, and the tool ram cannot be operated while traversing, as it is considered dangerous to have the two operations engaged at the same time.

Western Machine Tool Co. Purchases Garvin Tappers

The Western Machine Tool Works, Holland, Mich., has recently purchased the complete line of Garvin tapping machines built by the former Garvin Machine Co., New York, N. Y., and it is the intention to build a complete line of taper-roller bearing-equipped tapping machines.

The Garvin automatic tappers are equipped with Timken tapered roller bearings.

SHOP EQUIPMENT NEWS

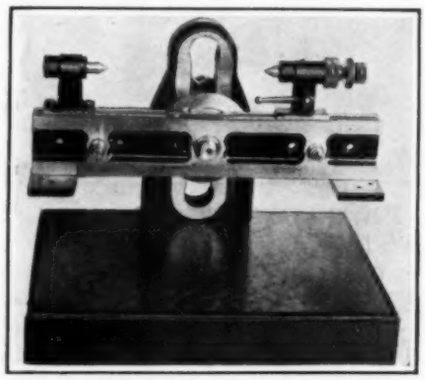
In operation a hand lever is brought down to the work until the tap engages, at which time the tap continues until a predetermined depth is reached. Then it is automatically reversed and withdrawn from the work.

Blodgett Sine-Bar Fixture

The Blodgett Engineering & Tool Co., 14th & Dalzelle, Detroit, Mich., has placed on the market a sine-bar fixture suitable for the testing of tapers on cylindrical parts and angles on planed and surface-ground work.

The sine bar is pivoted on a stud that has a vertical adjustment to accommodate work of various sizes so that by setting two outer buttons above or below the pivoting stud, to a correct dimension, any desired angle may be checked.

The base of the fixture is made of cast iron, hand scraped and flaked, measuring 3x12x16 in. The center distance between the two outer buttons is 10 in. and the maximum size of the work that can be supported on the centers is 10 in. long and 3 in. in diameter. The sine bar is hardened and ground, measures 1⅛x2⅞x16 in. and is provided with T-slots on both edges. The use of this fixture assists in checking and inspecting such work as reamers, taper plugs, pins and similar angular parts.



Blodgett Sine-Bar Fixture

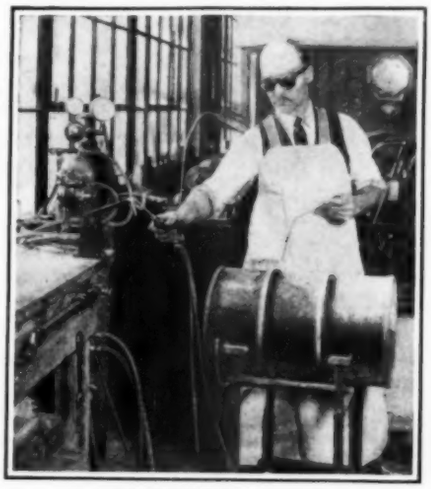
Erratum

In the description of the Arter automatic tappet grinding machine published on page 671 of the *American Machinist* the weight was erroneously stated to be 12,000 lb. It should have been 5,200 pounds.

Weldit "Gasaver"

A device for automatically shutting off the supply of oxygen and acetylene when the welding torch is not in use has been placed on the market by the Weldit Acetylene Co., Detroit, Mich. It is called the "Gasaver."

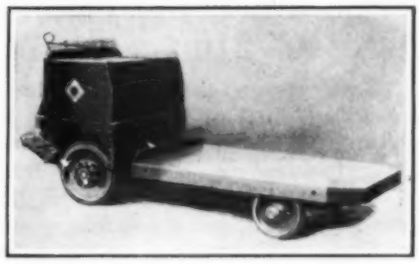
The principle involves two shut-off valves, controlled by a hanger arm on which the torch is hung. The correct flame adjustment is set so that when the torch is not in use it is hung by the projecting arm, stopping the flow of oxygen and acetylene. Upon lifting the torch and passing it over a convenient pilot light, it is lighted to the same flame as originally adjusted. Each "Gasaver" is equipped with a set of valves that automatically close if the torch should flash back, thus preventing injury to the regulators, hose or tanks. It is claimed that the device will reduce gas consumption 25 per cent on the average welding operations.



Weldit "Gasaver"

Elwell-Parker Electric Lift Tractor

The Elwell-Parker Electric Co., Cleveland, Ohio, has developed an electric lift tractor, especially suited to travel runways not altogether smooth. This haulage unit is of a broader gage than those designed for inside operation, the gage of the front and rear wheels being 30 in. The wheels are fitted with 22-in. drive and 15-in. front wheels, with either 3½- or 4½-in. tread. The drive wheels are fitted with double-row ball bearings weighing 13 lb. each and radial and thrust bearings measuring 7-in. outside diameter. The wheels are carried on drop-forged knuckles that support the weight of the axle, frame and load on a ball bearing. All rods are placed high beneath the platform to avoid contact with obstructions on runways. Full-floating alloy-steel drive shafts are used, fitted with chrome-vanadium universal joints.



Elwell-Parker Electric Lift Tractor

A drop-forged differential carries a bronze wormwheel, lock-bolted between the two halves of the differential cage. The tractor platform measures 40 in. in width and 72 in. in length, formed from a steel plate with deep side flanges. The platform nose is tapered to aid its insertion beneath a skid even though approached from an angle. The lift of the platform is 6½ in., making it 17 in. high when in lowest position and 23½ in. high when raised. The battery compartment is fitted with removable end doors and hinged cover to facilitate inspection or quick exchange of batteries. The wiring is arranged so that the leads between controler and battery are continuous. The construction of this tractor is sturdy, affording the hauling of substantial loads.

John B. Stevens Purchases Garvin Screw Machines

The entire line of Garvin screw machines, including the stop and open mechanisms and other features has been taken over by John B. Stevens, New Haven, Conn.

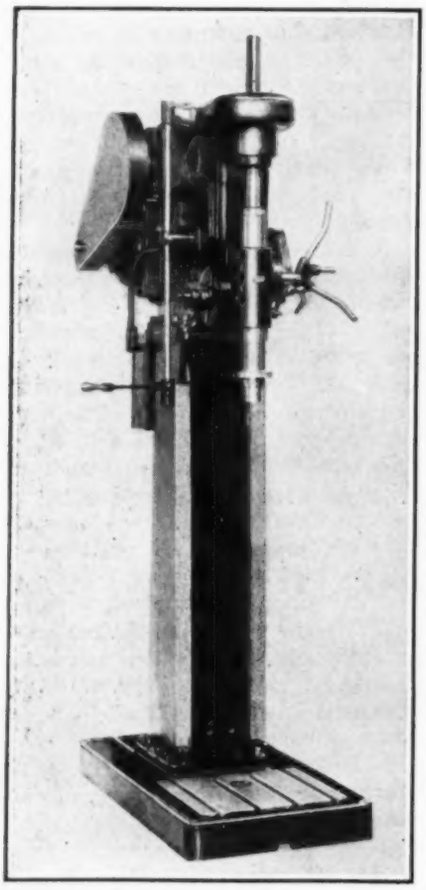
It is the intention to continue the manufacture of these machines, making any additions or changes that may be necessary to simplify chucking problems. The Garvin hand-screw machine will be maintained and improved. All repairs for these machines may be obtained from this concern.

SHOP EQUIPMENT NEWS

Barnes Reaming Machine No. 210 Special

The reaming machine illustrated is an adoption of the No. 210 self-oiling, all-geared drill and tapper manufactured by the Barnes Drill Co., 830 Chestnut St., Rockford, Ill., except that the column is longer and a 5-hp., self-contained motor drive has been added. The principal use of this machine is intended for the reaming of gas engine cylinders.

The work to be reamed is mounted on the table, and by use of the multiple head, that is fastened to the machine spindle, all holes are reamed simultaneously. The vertical shaft, provided with a lever, controls the multiple-disk clutch drive. This shaft is provided with a device to automatically operate the push-button control, preventing the possibility of applying the brake stop of the spindle of the machine, until the current has been shut off. There are stop, coast and start positions.



Barnes Reaming Machine, No. 210 Special

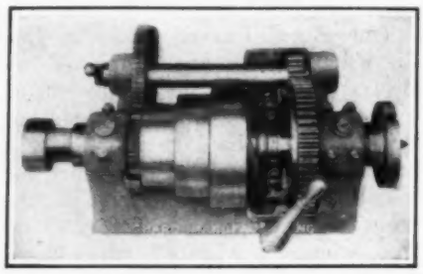
The additional length of the column permits the attaching of a suitable multiple head, reamer bars and jig attachments. This machine is used for the final reaming of cylinder blocks before they are honed on the No. 211 machine, also illustrated here. The floor space required is 48x34 inches.

Chard Quick-Start and Stop Lathe Head

The lathe head illustrated has been developed by the Chard Lathe Co., Newcastle, Ind., for use on rapid production work requiring turning, and for toolroom use where a rapid time-saving lathe is desired.

The headstock is furnished with a quick-stop and start back gear and a three-step cone pulley that is provided with a friction clutch. An operating lever, located at the front, is provided with two sets of toggles having two shifter forks attached, operating in a sliding cone and two brake shoes for applying the brake. The spindle has a sleeve mounted to it that passes through the cone so that the cone runs free on the sleeve in place of the spindle. On one side of the sleeve is fastened a gear, while on the other end is attached a flange that is tapered so that when the brakes are applied the sleeve is stopped. This construction allows the pulley to run free on the sleeve when the clutch is disengaged, using either open belt or back-gear drive.

When operating this head with open belt, the back gear is disengaged and a plunger pin is inserted through the large gear into the flange. At this position, the lever is thrown to the left, engaging the friction clutch in the pulley that in turn drives the sleeve and large face gear. To operate the back gear, the plunger pin is withdrawn in the usual manner.



Chard Quick-Start and Stop Lathe Head

Bullard Power-Operated Chuck

In order to aid in the reduction of idle time, the Bullard Machine Tool Co., Bridgeport, Conn., has brought out the power-operated chuck illustrated. The purpose of this chuck is to permit a definite control of the gripping power exerted on the work and to ease the required motion by the operator.

The primary actuating motion of this mechanism is a vertical pull exerted by a screw and nut. This motion is transferred to the three jaws of a standard chuck or special fixture by a bell-crank lever. When the pressure is set by power, it cannot be released except by the reversing of the motion. Its operation is controlled by a double clutch with angular teeth and compound gears that provide power in either direction. The driven portion of the chuck is brought in contact by a hand lever, operated to weigh the load of pressure on the jaws. The diagram shown illustrates the construction involved.

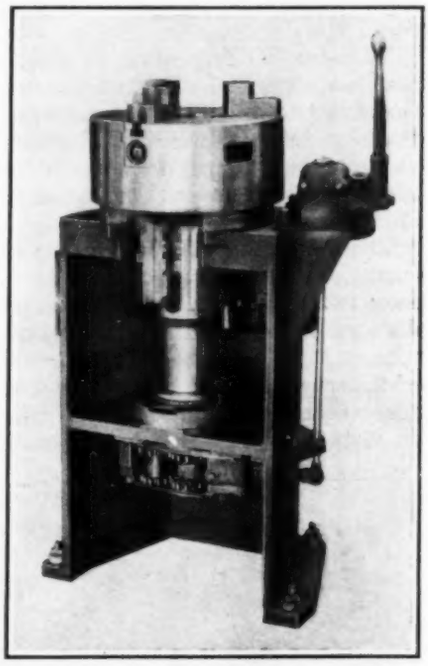


Fig. 1—Bullard Power-Operated Chuck

The chuck has been applied to the four- and six-spindle Contin-U-Matic and Vert-Au-Matic for the operation of both standard chucks and special fixtures. The chuck has been developed for application to machines

SHOP EQUIPMENT NEWS

now in use. It is also incorporated in the Mult-Au-Matic as a special feature, furnished only when specified for machines under construction.

In operation, it is necessary to throw the lever engaging the clutch either forward or reverse. The chuck is automatically disengaged

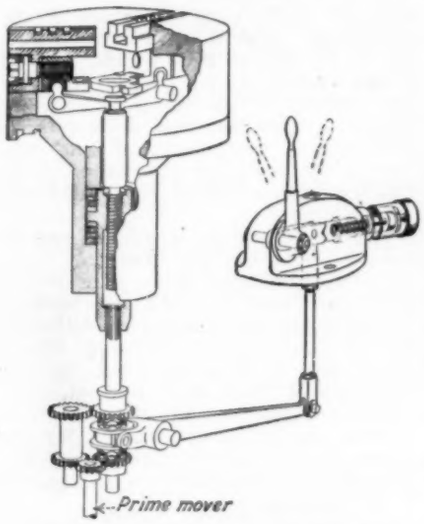


Fig. 2—Constructional details of chuck

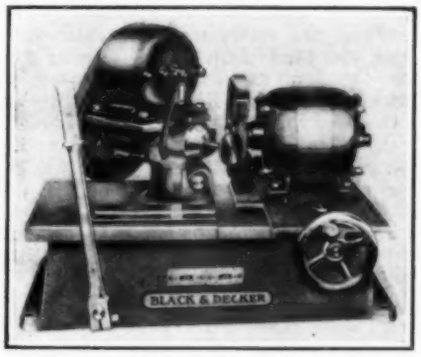
when the movement has been accomplished, making it impossible to build up an excessive jaw pressure by holding the clutch lever in the engaged position. This operating lever has been located on the carrier beside each spindle of the Contin-U-Matic, and for the Mult-Au-Matic a lever and clutch mechanism is located at the loading station of each chuck spindle. The time required for operating the chuck in either direction is two seconds.

Black & Decker Valve Refacer

The valve refacer illustrated has been added to the line of portable electric tools made by the Black & Decker Mfg. Co., Towson, Md. The device is used for the grinding of valve faces, permitting an angular adjustment to suit the work that is held by a spring collet. Three collets are furnished, $\frac{7}{16}$, $\frac{3}{8}$ and $\frac{7}{16}$-in. accommodating a majority of the valves used.

Two motors are used for operating this machine, one for the grinding wheel that is driven at 3,450 r.p.m. and one for the work spindle arranged to give a speed of 430 r.p.m. through a gear-reduction drive. Separate motors are used, due to the difference in speed required, and for the elimination of belts or flexible shafts.

The refacer has a three-point mounting support, so that the machine rests solid regardless of where



Black & Decker Valve Refacer

it is placed. The work carriage and the cross head are also mounted on three-point supports with suitable springs for holding them on the V-ways, so arranged as to take up any wear. Each motor is controlled by a toggle switch positioned in the front part of the base.

Skinner Chuck Co. Purchases Garvin Chuck Business

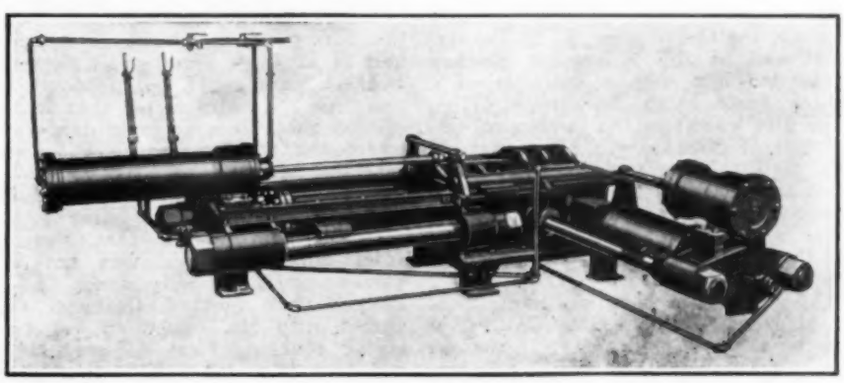
The Skinner Chuck Co., New Britain, Conn. has purchased the complete chuck business of the Garvin Machine Co., New York, N. Y. This stock of chucks includes the large assortment that the Skinner Chuck Co. has been supplying Garvin for a number of years.

Hydraulic Horizontal Baling Press

A horizontal press for baling ordinary scrap metal up to $\frac{1}{8}$ in. thick has been added to the line of machines manufactured by the Hydraulic Press Manufacturing Co., Mount Gilead, Ohio. The finished bale as produced by this machine is 10x10x16 in. and its weight is approximately 115 pounds.

The press is designed so that it can be located on the floor or in a shallow pit, the top of the baling box being level with the floor. The side, ends and bottom of the baling box are secured to each other by tie rods and dovetail joints, and the cover is mounted on a slide. All of these parts are lined with renewable steel plates. Mounted on the top of each high-pressure cylinder is a low-pressure cylinder for connecting to the air or low water pressure, so that the main cylinders may return to their initial position. The piston rod of one of these cylinders is fastened to the sliding cover so that after it has been pulled off the box it engages with the ram of the cylinder underneath it, that in turn returns the cover to its outer position. A feature of this press is that the cylinder, rather than the rams, backs into the box.

In operation the material to be baled is loaded into the box, the lid is slid into place by a double-acting cylinder controlled by a four-way cock, at which time pressure is applied to the main baling ram compressing the scrap to the far end of the box. This position is held by air pressure, and likewise the secondary or smaller ram is operated, compressing the scrap still further into one corner of the box.



Hydraulic Horizontal Baling Press

News of the Week

American Society of Mechanical Engineers Holds Regular Spring Meeting

Exhibit of power equipment adds interest to annual event

With a registration approaching 1,000 members and guests the American Society of Mechanical Engineers met in Milwaukee on May 18-22 for its regular Spring Meeting. Headquarters were at the Hotel Pfister. In conjunction with the meeting an exhibit of power generating and utilizing equipment was staged at the Milwaukee Auditorium.

The Council met on Monday morning, as did the Conference of Local Section delegates. The two groups joined for luncheon and immediately afterward the regular business meeting was held. At this meeting five standards were read by title. The principal business was the selection of San Francisco as the place for the Spring Meeting in 1926.

Afternoons of the meeting were given over to inspection of Milwaukee's many important industries. Luncheons were served at the plants of the Allis-Chalmers Mfg. Co. A reception and dance took place Monday evening and a banquet was enjoyed on Wednesday evening at which the Assistant Secretary of War, Hon. Dwight F. Davis was the principal speaker. His subject was "Industrial Preparedness as Insurance Against War." Mr. Davis emphasized the fact that we are preparing against war, not for it. His statement that we should stop talking about war and do something for peace was received with applause. With the introductory announcement of his conviction that no single nation or group of nations will dare to attack us if we are prepared to defend ourselves, the speaker proceeded to an outline of the industrial mobilization plan as given in his recent signed article in the *American Machinist*.

Before introducing the final speaker, Dr. W. F. Durand, president of the society, the toastmaster, F. H. Dorner, chairman of the Milwaukee Section, presented him with a painting of a beach scene by a Milwaukee artist. The gift was from the mechanical engineers of Milwaukee. After expressing his thanks for the gift, Dr. Durant said that most of the members of the society had had some part in the World War and were therefore fully aware of the seriousness of the delay caused by lack of organization. Their answer to the present problem is the establishment of the National Defense Division of the society. The society is anxious to help the War Department program but desires guidance to avoid wasteful duplication of effort.

From the viewpoint of machine shop men the high point of the session was the session on Tuesday morning at which Dr. Hans Klopstock, of Berlin, presented his paper on "Recent Investigations in Turning and Planing and a New Form of Cutting Tool." An abstract of this important paper will appear in the next issue. In presenting his paper, Dr. Klopstock gave full credit to A. L. DeLeeuw for his work along the same lines in 1913-14.

Mr. DeLeeuw, in his discussion of the paper, emphasized the value of polishing the top surface of a tool stating that production on a certain job had been increased from three to eleven pieces per grind by polishing. He also criticized the machine tool builders for not following the lead given to them in 1917 when he described essentially the same tool before a meeting in Cincinnati.

Prof. Boston, of the University of Michigan, complimented Dr. Klopstock on the excellance of his instrument calibration and on the checking of his electrical and mechanical measurements within ½ per cent.

B. H. Blood brought out the fact that the original cutters for Maag gears had the same sort of a depression on the top surface as advocated by Dr. Klopstock. At the end of the session Dr. Klopstock showed a motion picture of the action of a planer tool taking a chip. Actual chips and animated diagrams were both shown in the film.

At the same session, which was presided over by R. E. Flanders, of the Jones & Lamson Machine Co., a paper on "Defects in Large Forgings," was offered by J. F. Harper, research engineer of the Allis-Chalmers Mfg. Co. The speaker classified defects as (1) due to faulty material or (2) due to improper fabrication. He advocated the boring of a central exploratory hole in all large forgings so that the weakest part could be inspected by periscope. He also stated that in his opinion ghost lines are only dangerous where the forging has to withstand reversing stresses.

T. D. Lynch, Westinghouse E. & M. Co., also advocated the use of the periscope and stated that pouring from different ladles was not advantageous if properly done. J. D. Cox, Midvale Steel & Ordnance Co., agreed with Mr. Lynch on the combining of heats from different ladles and gave it as his opinion that ghost lines are not serious defects.

Other papers of interest to the machinery industry were the three read at the Materials Session. The titles were "The X-Ray Examination of Steel Castings," by I. E. Moultrop and E. W. Norris; "Aluminum and Its Light Alloys," by R. L. Streeter and P. W. Faragher; "Stress Concentration Produced by Holes and Fillets," by S. Timoshenks and W. Dietz. Also the four papers of the Materials Handling Session: three on the economies of labor-saving equipment and one comparing the economic efficiencies of the full automatic and semi-automatic turret lathes.

At the National Defense session, presided over by Col. Frank A. Scott, Warner & Swasey Co., there was a profitable discussion of procurement planning and industrial mobilization led by Capt. A. M. Shearer, Signal Corps; E. A. Russell, chief, Chicago Ordnance District; R. P. Lamont, chief, Chicago Air Service District; Col. C. L. Hinkle, chief, Chicago District for Engineer Corps, and H. S. Johnson, Gisholt Machine Co., Madison.

Apprenticeship Problems

The Apprenticeship session, presided over by Dean Sackett of Penn State, was devoted to discussion of a national apprenticeship program put forward by Harold S. Falk, Falk Corporation. Discussion was led by H. S. Rogers who spoke on the district apprenticeship plan of Milwaukee; F. W. Thomas who outlined the place of railroad apprenticeship in a national plan; and R. L. Cooley who told about the vocational schools of Milwaukee.

The paper by L. K. Sillcox, general superintendent of motive power, C. M. & St. Paul Ry. Co., on "Factors Concerning the Economies of Shopping Steam Locomotives," was one of the high spots of the meeting. It brought out valuable discussion and will be abstracted in a later issue of the *American Machinist*.

The report of the nominating committee included the following slate of officers to be voted on by the membership: President, Wm. L. Abbott, Chicago; vice-presidents, A. G. Christie, Baltimore; Wm. T. Magruder, Columbus; Roy V. Wright, New York; managers, Robt. L. Daugherty, Pasadena; Wm. Elmer, Altoona; Chas. E. Gorton, New York; treasurer, Erik Oberg; delegates to American Engineering Council: W. L. Abbott, A. M. Greene, Jr., J. L. Harrington, Ira N. Hollis, S. A. Libbey, D. S. Kimball, W. B. Powell and H. L. Thompson.

At the Power Show the following machine tool builders and other manufacturers of products used in the machine shop had exhibits:

Allis-Chalmers Mfg. Co., Milwaukee, Wis.; The Louis Allis Co., 133 Stewart St., Milwaukee, Wis.; American Elec-

tric Motors, Inc., 57 Erie St., Milwaukee, Wis.; Builders Iron Foundry, Providence, R. I.; Burke Electric Co., Erie, Pa.

Cutler-Hammer Mfg. Co., Milwaukee, Wis.; Fairbanks-Morse Co., 900 So. Wabash Ave., Chicago, Ill.; Falk Corporation, Milwaukee, Wis.; General Electric Co., Schenectady N. Y.; Howell Electric Motor Co., Howell, Mich.

Industrial Controller Co., 886 Greenbush St., Milwaukee, Wis.; O. O. James Mfg. Co., 1114 Monroe St., Chicago, Ill.; Kearney & Trecker Corporation, West Allis, Wis.; Link Belt Co., 300 West Pershing Rd., Chicago, Ill.; Manning, Maxwell & Moore, Inc., 27-9 No. Jefferson St., Chicago, Ill.; Nugent & Co., 410-2 N. Hermitage Ave., Chicago, Ill.

Power 10th Ave. at 36th St., New York; Ramsey Chain Co., Inc., Albany, N. Y.; Republic Flow Meters Co., 2240 Diversey Parkway, Chicago, Ill.; Chain Belt Co., Milwaukee, Wis.; Foote Bros. Gear & Machine Co., 114 Grand Ave., Milwaukee, Wis.

Kempsmith Mfg. Co., 45th & Rogers Sts., Milwaukee, Wis.; Leather Belting Exchange, 119 So. 4th St., Philadelphia, Pa.; Lincoln Electric Co., 610 Sycamore St., Milwaukee, Wis.; Snap-On Wrench Co., 1270 So. Pierce St., Milwaukee, Wis.; American Metal Products Co., 1351 Burnham St., Milwaukee, Wis.

S. F. Bowser & Co., Inc., Fort Wayne, Ind.; Fafnir Bearing Co., New Britain, Conn.; W. A. Jones Foundry & Machine Co., 4401 W. Roosevelt Rd., Chicago, Ill.; Reeves Pulley Co., Columbus, Ind.; Strom Ball Bearing Mfg. Co., 4502 Palmer St., Chicago, Ill.

Chamber of Commerce of the U. S. Holds Annual Meeting at Washington

Opposed to unnecessary government supervision of business

Closing a four-day session at Washington, the Chamber of Commerce of the United States set itself down as a body of American business men opposed to the interference of Government in business, except where that interference is necessary in the public welfare. While no one of the resolutions adopted at the final session on Friday had a direct bearing on the machinery industries, all of them deal with matters of broad public concern. Of the nineteen resolutions passed the one which perhaps has more immediate interest to our readers is the one urging the Government to prevent action on the part of any of its agencies calculated to harass and annoy business. This resolution embodies a statement to the effect that business men will not object to full investigation by duly authorized officials who may have good reason to suspect that the law is being violated. The resolution also urges co-operation with the executive department in the dissemination of useful and valuable information since the agitation for proposed changes in the transportation act creates uncertainty and retards business. Another resolution urges a further trial of the Transportation Act in its present form.

The Interstate Commerce Commission was commended for its administration of laws governing the common carriers. It was the sense of the meeting, however, that an amendment which will extend the act to motor common carriers is justified.

Supports Trade Commission

Despite the utterances of Senator Borah and others, a resolution was adopted expressing the belief that the Federal Trade Commission, operating under its new rules of procedure, will result in constructive, effective and helpful service to American business.

The election of officers for the ensuing year resulted in the selecting of John W. O'Leary as president; regional vice-presidents, Louis E. Pierson, New York, William Butterworth, Moline, Ill., Robert R. Ellis, Memphis, and Paul Shout, San Francisco. Owen D. Young, of New York, prominent in this industry as a manufacturer of electrical machinery, was elected an honorary vice-president. Other honorary vice-presidents are: Henry M. Robinson, of Los Angeles, and R. W. Boyden, of Boston. John Joy Edson, of Washington, was elected treasurer.

The several sessions of the conveniton were crammed with interesting discussions, not the least important of which were the addresses delivered by Secretary of Commerce Herbert Hoover, by Julius H. Barnes, president of the Chamber, and by Henry R. Robinson, a member of the Dawes Commission.

Solving German Problem

That a plan has been devised to get wealth out of Germany, without disrupting industry in other countries, was revealed at the dinner of the American Section of the International Chamber of Commerce. The idea is to apply German production capacity to wealth-creating enterprises, particularly in countries where development has been retarded. Were Germany to furnish the materials and supplies for a railroad which would make possible the opening of new mines, new forests and new agricultural wealth, to cite an example used by Julius H. Barnes, no market would be taken away from any one. New peoples would acquire buying power, new wealth would be created and the world would benefit.

This was held to be vastly superior to the dumping of goods for current consumption upon an amply supplied market which would mean the displacing of the output of plants in other countries. By confining German effort largely to that type of production which represents large proportions of German iron, German coal and German labor, is better than having Germany import raw material for manufacture and then export the same material, plus a small value added by the manufacturing process.

Thoughts along the same line were expressed by Henry M. Robinson, of Los Angeles, a member of the Dawes Commission. In the course of his remarks he said:

"In reparation payments the greatest stimulus for the development of new areas may be found. If Germany cannot pay in gold, goods must be taken. Ingenious plans will be developed for taking out of Germany the products of that country that can be used in the development of new areas, where such products would not come in direct competition with the producers in the countries that are Germany's creditors.

"For many years prior to the war international trade was promoted to a large degree by the investment of foreign capital in the relatively undeveloped areas of the world. The United States not only has an exportable surplus, but, in addition, has a very large annual income from investments abroad. This latter item will increase as time passes. We will continue to invest in other parts of the world just as Great Britain did in the development of railroads, tramways, nitrates, rubber, tin, and tea. She made large investments in enterprises in Canada, South Africa, Australia and other colonies.

"This type of capital invested has important results in that it furnishes markets for machinery and other supplies for the country making the investment. It results in the development of great natural resources. The people making the investment receive a good return on their capital. The world at large derives a lasting benefit from the increase in the supply of important raw materials and particularly in the increased buying power of the people in the countries where such investments are made."

The fact that a practical way had been found to transfer reparation credits out of Germany was one of the promising indications of an improved European situation. Pierre Jay, chairman of the Board of the Federal Reserve Bank of New York, cited the return of the British to the gold standard as another momentous development tending toward the rapid improvement of the world situation.

A New Attitude

A domestic development regarded as of encouraging and far-reaching import was the announcement of a new ruling on publicity by the Federal Trade Commission.

This announcement came in the address of W. E. Humphrey, a new member of the commission.

The significance of this change of attitude was recognized as going deeper than the activities of the Federal Trade Commission. The appointive power of the administration was used in such a way as to bring about this change of policy which is taken to mean that the creed really sets forth the administration's attitude toward business.

In urging the nation to continue to build on what it has rather than experimenting with other types of con-

struction, Robert F. Grant, president of the Chamber, pointed out that "in the last election one-seventh of the votes cast were for a platform which favored public ownership of the nation's water power; retention of surtaxes on large incomes; restoration of taxes on excess profits and on stock dividends; progressive taxes on large estates and inheritances; reconstruction of the federal reserve and farm loan system to provide for direct public control of the nation's money and credit; creation of a government-operated marketing corporation; protection and aid of cooperative enterprises by government and state aid legislation; repeal of the Esch-Cummings law; public ownership of railroads; curtailing the power of the courts; and the election of all federal judges for limited terms. Over four million six hundred thousand people voted for this platform."

Because of this situation Mr. Grant urged that the Chamber of Commerce continue its process of educating the American public in basic economics and of American business to govern itself.

Judge Robert W. Bingham, the publisher of the Louisville Courier-Journal, urged the encouragement of selling cooperatives among farmers. He believes they will do for the agriculture of this country what they have done for that of Denmark.

Lethargy of Citizenry

Chief Justice Taft, former president of the United States, paid a notable tribute to the American business man in the course of his remarks at the dedication of the new building of the Chamber of Commerce. "Taken together," he said "you have no selfish or other aim, narrow and contracted, that blinds you to the general good. You are not cranks. You are not men of one idea. As much as any set of men, you have in you, as a whole, the catholic spirit of good will to all elements of our society."

In commenting on the need for an intelligent public opinion, the Chief Justice declared that one of the difficulties in bringing public opinion to bear upon the direction of Government is the "lethargy of the ordinary citizen and his indisposition to develop an interest in important general questions." He commended the Chamber of Commerce for its efforts in arousing the citizen "to a sense of responsibility in a quasi-judicial self-examination of his own views and by comparison with the views of his fellows brings about definite conclusions out of a nebulous, lazy, ignorant condition of mind that so often persists, even among the intelligent, but indifferent."

At the dedication ceremonies Mr. Grant, president of the Chamber, called attention to the fact that the new edifice occupies the site of a house occupied by Daniel Webster when he was Secretary of State. He quoted one of Webster's great sentences: "Let us develop the resources of our land—call forth its powers, build up its institutions—promote all its great interest, to see whether we also in our day and generation may not perform something worthy to be remembered." Mr. Grant expressed the opinion that the business men and the cities and the towns, scattered throughout the country who had made the new building possible, have "in our day and generation performed something worthy to be remembered."

Herbert Hoover, Secretary of Commerce, addressed the general session Thursday evening on "Waste in Government." He considered only those wastes which arise from improper organization and from a mixing of administrative functions with those of a semi-judicial and semi-legislative character. He declared that there was need for three primary reforms: First, to group together all agencies having the same predominant major purpose under the same administrative supervision; second, to separate the semi-judicial, the semi-legislative and advisory functions from the administrative function, placing the former under "joint minds"—that is, boards, commissions and committees—the latter under single responsibility; third, to relieve the president of a vast amount of direct administrative labor by putting the independent establishments now reporting to him into the existing executive departments.

As an indication of the wastes in separating agencies having the same major purpose he showed that public works construction is now performed by fourteen bureaus scattered through nine departments; that the conservation of natural resources is covered by eight bureaus in five departments; and that there are direct aids to the merchant marine in fourteen bureaus in six departments. This scattering results in constant conflict of view with the Government itself, preventing the formation of a definite and consistent policy. At the same time needless expense is imposed upon the public in seeking the information it wants, settling the demands upon it and determining the regulations by which it is required to conduct its business. Within the government itself there is also waste of the taxpayers money.

Congress has from time to time imposed semi-judicial and semi-legislative functions upon executive departments or independent establishments and these functions and administrative work have become hopelessly mixed. The Shipping Board is a glaring example of ineffectiveness arising out of such mixture of functions. Mr. Hoover cited the semi-legislative functions of the Secretary of Agriculture in the administration of the stockyards and commodity exchanges as another unfortunate instance of mixing semi-legislative and administrative functions. Every department, bureau and board should be examined and a separation made between the semi-judicial and semi-legislative functions on the one hand and administrative on the other. The former rightly belongs to boards or commissions, the latter to individuals.

Legislation has imposed upon the President no less than forty independent establishments which are supposed to function directly under the President. It is preposterous to expect the President to give them anything like adequate supervision. These establishments conduct their activities with very little supervision or coordination. Such of them as have straight administrative functions expend nearly half a billion a year—as much as the total of five of the departments under cabinet officers. If for no other reason this group should be placed directly in some department where they may have proper administrative guidance and control.

Finally, Mr. Hoover objected to further expansion of federal authority, as against state authority, except where constitutional inhibitions prevent state solution, or where over-powering and destructive action would result to local communities unless there were federal control.

Concluding, Mr. Hoover said: "I do not expect that the Federal Government will ever be a model of organization, but I have aspirations to see it improve. Someone has said that the first ten years in any needed reform are the hardest. The first ten years are up."

Automotive Maintenance Equipment Show Exhibits Latest Service Station Tools

Convention papers discuss apprenticeship problem

Those mechanically inclined found much to interest them in the Second Annual Automotive Maintenance Equipment Show and Service Convention conducted under the joint auspices of the Society of Automotive Engineers and the National Automobile Chamber of Commerce, held in Detroit May 20 to 23. Mornings were devoted to the show held in the General Motors Building and the afternoons to the papers read before the convention.

The show emphasized the thought being given to maintenance matters today by engineers in general. Many of the machines showed as much consideration bestowed on them as is usually done on production types of machines.

One noteworthy factor in evidence was that the makers of the small tools shown were specialists in their line.

Most of the tool exhibits were of a high order of excellence. The Cedar Rapids Engineering Co., the Master Manufacturing and Sales Corporation, the Black & Decker Manufacturing Co., the Hutto Engineering Co., the Storm Manufacturing Co., the Frank Danielson Manufacturing Co., the South Bend Lathe Works, the Shoemaker Automotive Equipment Co. were among the exhibitors. The exhibit of the Van Norman Machine Tool Co., demonstrated machines for garage purposes and particularly for finishing pistons. Other exhibits included electrical devices, wrenches, small tools and micrometers. It was stated by Harry Cobleigh, of the National Automobile Chamber of Commerce, that the show represented

80 per cent of the makers of equipment and also that of the 68,000 official service stations in the country, 52 per cent use hand tools only and the remaining 48 per cent are variously equipped with various machine tools.

Service at a Profit

The meetings of the convention had for their keynote the slogan "Service at a profit." Due to the increase in reliability of cars and the improvements in highways, there is no longer required the same large amount of overhaul and repair that used to obtain formerly. Cars come into the repair shop less frequently and for a smaller amount of work. This has necessitated the service man to become a salesman of his work and a financier in doing it profitably. J. E. Mills, service manager of the Packard Detroit Branch pointed out how the budget system was a necessity to the service man who wanted to stay in business at a profit. Howard A. Coffin, whose paper was read by Mr. Cobleigh, dealt with the personal equation and gave some fundamental points dealing largely with courtesy towards owners, which he said would convert a liability into an asset.

There was much discussion of the paper by Robert C. McWane on "Engine Reconditioning." Mr. McWane gave considerable detailed information as to the methods of doing work and the tolerances and allowances that were to be followed in producing satisfactory results. He believed strongly in grinding a cylinder as opposed to reaming or honing. L. A. Danse, of the Cadillac Co., discussed the methods employed by his company, pointing out that so far a perfect method of finishing cylinders accurately had not been found. Even the grinding wheel will follow the natural contour of the cylinder bore and will not produce an accurate and straight hole. A good cylinder, Mr. Danse stated, should be within 0.00025 in. of being round, and should have a deviation from straightness of less than 0.0005 in. Motor reconditioning in general was described by all as having for its basic factor a perfect realignment of all parts.

The flat rate and piecework system now coming into general use was discussed at some length by William G. Gow of the Studebaker Sales Co., of Newark. The discussion showed that there was practically unanimous belief in the value of this system as a means to better and more profitable service.

Training Mechanics

One big problem facing the service manager is the training of mechanics, and a special session was devoted to this as well as part of the regular session, at which J. F. McDonald, of the Ohio Buick Co., presented a paper on his own personal work in training men along what might be called genuine apprenticeship methods. Mr. McDonald is a product of the old school of apprenticeship and is a firm believer in its results. Boys are started in his system as greasers and cleaners and gradually progress up until they are capable of handling complicated overhaul and repair jobs. During this time they are being instructed in the fundamentals of the work they are doing and this educational part is even continued after they have become full fledged mechanics. The special session devoted itself to the co-operation between the high schools, the Y. M. C. A. work and the repair shops, and a plan was presented for the bettering of conditions in this respect.

The convention was well attended, there being a registration of over 350.

Iron and Steel Institute Hears Gary Diagnose Present Business Ills

British Ambassador answers Houghton

Two important addresses marked the high spots of the twenty-seventh general meeting of the American Iron and Steel Institute, held in the Hotel Commodore, New York, on Friday, May 22. The first was the annual address of Elbert H. Gary, chairman of the U. S. Steel Corporation and president of the Institute. The other was the address of Sir Esme Howard, British Ambassador to the United States.

More than a thousand leaders of the iron and steel industry were present at the conference. The speakers at the morning session, besides Judge Gary, included W. H. Bailey of the Illinois Steel Co., Leo H. Miller, chief engineer of the American Institute of Steel Construction, and H. D. Savage of New York.

At the afternoon session the speakers were: Charles O. Hadly, general manager of the Alan Wood Iron and Steel Co.; Dr. C. T. Wang, former acting premier of China; and W. J. Corbett, assistant director of the Electric Steel Founders Research Group, of Chicago.

Famous for his business optimism, Judge Gary declared that "the attitude, conversations, substance and manner of statements concerning the present conditions and future prospects of business often materially affect its progress and success."

The business structure of the country also showed the effects of the war, of political uncertainties, of high taxes, and of the high cost of living.

Diseases of Business

Judge Gary then proceeded to list the "diseases of business" and named as the worst of them all "the abnormal, unnecessary, timid, and ill poised mental attitude of the managers themselves, including ourselves."

He said, in part:

"The iron and steel business in the United States at present is prosperous as compared with the latter part of 1913, for instance, and many other temporary periods that might be mentioned, yet it is not in some respects entirely satisfactory. It is not quite as good as it ought to be when one considers the underlying conditions of the country. Notwithstanding it has been the inclination and effort of the leaders in this industry, or many of them at least, so far as they legitimately could, to encourage stability and confidence, there are witnessed from time to time fluctuations and hesitations in the natural progress of business that are unreasonable and uncalled for. This is to be deplored. It is unhealthy and adversely affects the whole business structure. It is proper for all of us to consider and to discuss reasons and remedies.

"If the business system of this country is now, in any of its parts, physically or mentally, perceptibly below normal there must be reasons. And if so, it behooves every citizen to look for the reasons and to exert every effort to find and apply remedies; for successful progress and fair prosperity in business are always essential and of the first importance to the life, health and happiness of the people everywhere on earth.

"We of the iron and steel industry believe we are qualified to express the opinion that our business, although sound and enjoying better health than in other periods which might be mentioned, is unnecessarily afflicted with impediments and obstructions which, for purposes of discussion, may be classified as disease, even though we may not be competent to fully and accurately diagnose.

The British Argument

At the banquet in the evening the principle speaker was Sir Esme Howard, British Ambassador to the United States. Sir Esme's words were received with more than usual interest, as many saw in his remarks the British answer to the recent speech made by our own ambassador to the Court of St. James, Mr. Houghton.

The British argument that trade is the only solution of Europe's trouble, taken together with the significant delineation of America's commercial responsibility to the rest of the world, is viewed here as a polite but firm appeal that the tariff wall erected by the Fordney-McCumber law be reduced or modified.

It would have been indiscreet for the British Ambassador specifically to criticise the tariff law but without treading on the undiplomatic ground he showed the relationship between exports and imports in the British-American trade and said plainly enough for American officials to grasp his meaning that unless Britain sells more goods to America neither she nor the rest of Europe can pay war debts.

A significant part of his message was spoken in these words:

"All I ask is that there should be in America a sympathetic understanding toward those who are endeavoring to bring together the jarring and conflicting elements of Europe, and endeavoring to see if they cannot work together, for economic, if not for any higher reason, for the good of all."

The guests at the banquet included Sir Esme Howard, British Ambassador to the United States; Major-Gen. Charles P. Summerall, commander of the Second Corps Area, and Howard Wade, author.

General Development of Machinery and Allied Industries in Alsace

Development promises competition for French industry

It is usual when considering the provinces of Alsace and Lorraine, which came back to the French fold as a result of the war, to consider them collectively. This has sometimes resulted in the neglect of Alsace in favor of Lorraine. In a general way Lorraine may be said to be the cradle of siderurgy and metallurgy, while Alsace using these raw and semi-raw materials in bulk turns them out in various fabricated forms far in excess of what is the case with Lorraine alone.

This is particularly true of the important textile machinery industry. Alsace is essentially a district of diversified individual industries, whereas Lorraine finds its heavier industries centered in comparatively few hands. The Department of the Moselle, which represents Lorraine, has 105 big industries (mines and blast furnaces and steel mills) employing 43,684 workers while of the diversified industries of Alsace, the textile industry alone has 5,866 separate establishments employing 78,158 workers.

Rail Supplies Important

Briefly the mechanical and machinery industries are represented as follows: In the Department of the Bas-Rhin there are two important establishments whose specialty is rolling stock and motive power for railways of normal gage. The first in importance is the Société Alsacienne de Constructions Mécaniques, at Graffenstaden; and the second that of Dietrich et Cie, at Niederbronn-Reichshoffen. The first named employs 2,500 workmen and turns out normally 120 locomotives each year out of a total production of nine hundred for all France. The Dietrich firm employs from 2,500 to 3,000 workmen and specializes on passenger coaches and freight cars. Its daily production is two coaches and fifteen freight cars, in normal years 600 passenger cars and 4,500 freight cars. In addition, it has a contract for furnishing all the frogs and switches for the Alsacian railways.

The Société Alsacienne de Constructions Mécaniques furthermore specializes in metal working machinery and tools and hoisting apparatus. The firm stands alone in the district of the Bas-Rhin for the production of machine tools, of which the output is from 1,500 to 2,000 metric tons per annum. It produces also from 1,000 to 1,500 heavy lifting jacks, and from four to six gross of weighing appliances of all kinds per month.

The automobile and bicycle industry are worthily represented. The Bugatti automobile produced at Molsheim is one of the highly finished small car products of Europe, and the Mathis of Strasbourg may be said to be the only serious competitor of the Citroen light car in France. The latter firm dates from 1898 and has an annual production of about ten thousand cars, which apart from three others in France, is considered a large production. The plant gives employment to 2,500. The Bugatti sport cars demand the finest and most highly specialized labor.

A recently organized firm is producing, 1,000 spark plugs per day and the production of wood and metal working tools is also important.

The Forges de Strasbourg have an output of 30,000 tons of iron and steel sheets and this industry has recently given impetus to the production of steel office furniture, filing cases and the like, of which the output is already estimated at 2,400 tons per year. In addition the same firm produces household hardware and light steel articles.

The manufacture of brewery and distillery equipment is important, as represented by the firm of Kolb et Cie at Strasbourg. Refrigeration machinery is a specialty of Quiri et Cie at Strasbourg-Schiltingen, the greater part of this production being exported. Milling machinery is put out by Schneider, Jacquet et Cie at Strasbourg-Koenigshoffen, which firm also specializes in water power turbines.

Paper making machinery is an important specialty at Strasbourg and the production of wire screens is concentrated in three establishments at Selestat, where the production of this specialty equals half of the entire French output.

Other tool and machinery specialties are produced in various plants distributed through the country—boilers, steel construction and agricultural machinery, the latter notably at Selestat and Saverne.

From the above survey it is clear that Alsace is essentially a manufacturing country rather than one of agriculture. And as such, now that it is French again, brings an element of competition with the manufacturers of what may be called old France, a condition which was non-existant before the war. A period of adjustment is naturally foreseen in these lines, as well with the important textile industries.

U. S. Leads Germany in Machinery Exports to Spain

German machinery exports to Spain decreased sharply in 1924 under the two preceding years, about 11,580 metric tons less being exported to the Spanish market in 1924 than in 1922, according to advices to the Department of Commerce from Vice-Consul Erix W. Magnuson, Stuttgart. Machinery exports decreased in weight from 18,673 metric tons in 1913 to 18,297 tons in 1922, to 11,353 tons in 1923, and to only 6,708 tons in 1924. Among the various types of German machinery exported to Spain, internal combustion engines, metal-working machinery, and textile machinery lead in importance.

Shipments of metal and wood working machinery from Germany to Spain declined considerably in 1924, decreasing from 1,506 metric tons in 1913 to 2,318 tons in 1922 to 1,231 tons in 1923 and 721 tons in 1924.

United States exports of industrial machinery to Spain mounted to $1,897,776 in value last year or about $50,000 greater than those of 1923 according to the industrial machinery division of the Department of Commerce. American exports of this equipment to Spain during 1923 amounted to $1,839,934—an increase of about 37 per cent over 1922. The 1924 figure, therefore, while it shows no decided gain over the preceding year, indicates that the increased market for American machinery in Spain experienced in 1923 has been maintained during the year.

Trade Commission Adopts Publicity Rule

From and after May 1, 1925, in the settlement of any matter by stipulation before complaint is issued, no statement in reference thereto shall be made by the Federal Trade Commission for publication. After a complaint is issued, no statement in regard to the case shall be made for publication until after the final determination of the case.

After a complaint has been issued and the answer of the respondent has been filed, or in case the respondent fails to file an answer by the rules provided, the papers in the case shall be open to the public for inspection, under such rules and regulations as the secretary may prescribe.

It has been the rule, which is now abolished, to issue a statement upon the filing of a complaint stating the charges against a respondent. In the opinion of the majority of the Commission this statement, which is given wide publicity, has resulted in many cases in damage to the respondent, and if such a case is later dismissed the publicity given the dismissal does not repair the damage thus resulting in injustice. Of course, the proceedings in the case must become public, but the majority believes it to be fair to withhold publicity until the respondent's answer is filed and then to make the complaint and the respondent's answer available to the press and public at the same time.

Commissioner Thompson dissented to its adoption of this rule, stating:

"I am against this rule because it is contrary to the letter and spirit of the Federal Trade Commission Act and the Constitution of the United States; because it will permit Star Chamber proceedings to be carried on and the applicant not informed as to what is taking place; and because it will deprive a minority of the right to express its views publicly, and hence is wholly dangerous and perversive of the public welfare.

Bolivian Exhibit

An industrial exhibition will be one of the features of Bolivia's centennial, which will be commemorated in August of this year. American participation has been requested formally.

The Bolivian government offers free sites for exhibits. Reduced freight rates for goods to be exhibited have been arranged and exhibits will be admitted duty-free.

A.S.T.M. Plans Meeting for Next Month

The twenty-eighth annual meeting of the American Society for Testing Materials will be held at the Chalfonte-Haddon Hall, Atlantic City, N. J., during the week of June 22. Monday afternoon and evening and Tuesday morning and afternoon have been reserved for committee meetings. The committee on Papers and Publications has been able to arrange the program so that the afternoons will be left open for committee meetings and for recreation. To provide for this, on three occasions simultaneous sessions will be held, the total number of sessions being ten. The committee has thought it advisable to have a single session for both the opening and closing sessions. The program has been arranged accordingly, and the opening session is on Tuesday evening. A general session will be held on Wednesday evening at which the president's address will be presented, followed by the annual smoker and dance; and another general session on Thursday evening will be devoted to testing and other matters of general interest, such as research and the writing of specifications.

Among the subjects to be discussed at the technical sessions are: Testing and Nomenclature, Purchase Specifications, Corrosion, Metals at High Temperatures, and various others.

The certificate plan of railroad transportation, which proved to be of considerable advantage to the members last year will again be put into effect.

Summer Session of Carnegie Tech

Special attention will be given again to the wide range of engineering courses this year at the summer session of the Carnegie Institute of Technology. The summer work, which will cover both theoretical class room instruction and shop practice, is outlined, according to an announcement, to be of special benefit to undergraduates and to those engaged in engineering work who feel a need for more technical training in their respective fields. Courses of six and eight weeks will be given, beginning June 15.

The College of Engineering will give courses in Chemistry, Physics, Mechanics, Engineering Drawing, Descriptive Geometry, and Surveying.

In the College of Industries, courses are scheduled in Plumbing, Welding, Mechanical Drafting, Sheet Metal Work, Patternmaking, Machine Shop, Woodworking, Cabinetmaking, Electricity, Radio Communication, and Drafting.

Engineering Council to Study Aircraft

The American Engineering Council, through its administrative board, meeting at the Philadelphia Engineers' Club, recently voted to undertake what is described as the first exhaustive investigation of the aircraft situation yet made in this country. The various aspects of the problem, military and civil, will be thoroughly sifted by a special committee, which is expected to occupy one year in the task at an estimated cost of $50,000.

The board's action followed the adoption of the report of the Council's Aeronautics Committee. The report warned that the present confused situation is a national menace both as to preparedness and commercial developments.

A spirited discussion took place among the engineers over the question whether the preparedness factor should be stressed in the inquiry about to begin. Dr. H. E. Howe of Washington, treasurer of the Council, declared that the possibility of war should not be ignored, and Prof. C. F. Scott, of Yale, expressed the view, shared by several other members of the board, that the investigation should emphasize commercial aviation. The resolution as finally adopted provides for the consideration of both civil and military conditions.

The present Committee on Aeronautics of the council was dismissed, its work having been completed with the presentation of the report.

Business Items

The Sullivan Machinery Co. announces the establishment of a new branch office at Pottsville, Pa., in charge of A. K. Owen. The office will be maintained in conjunction with the Pottsville Supply Co., at 208 West Market St., and will carry a complete line of Sullivan products.

The Republic Flow Meters Co., of Chicago, announces the opening of a factory branch in Cleveland. The new plant will operate from No. 617 Engineers Bldg., Cleveland, and will be in charge of L. C. Wilson, formerly of the company's Pittsburgh branch.

The Thomson Electric Welding Co., of Lynn, Mass., has moved its Chicago office from 817 Washington Blvd. to 514 Machinery Hall, on West Washington St. The office is in charge of F. H. Leslie. This company also announces that it has discontinued its connection with the English & Miller Machinery Co., of Detroit, and is now represented in this territory by James A. Muir, whose headquarters are in the General Motors Bldg. On June 1 the Cincinnati office will be discontinued and a new office opened at 852 Leader Bldg., Cleveland, in charge of C. E. Seifert and M. G. Littlefield.

Warren Webster & Co., of Camden, N. J., announces the removal of the Cincinnati branch office to 919 Provident Bank Bldg., in charge of W. C. Green.

The American Manganese Steel Co., of Chicago Heights, Ill., has recently put in operation a new foundry for the manufacture of Amsco manganese steel castings at Los Angeles, Calif.

The W. W. Sly Manufacturing Co., of Cleveland, Ohio, announces the establishment of a branch office at 215 Security Bldg., Springfield, Mass. This office will be in charge of Daniel L. Harris, who for some time past has been assistant sales manager of the company.

The Reed-Prentice Co., of Worcester, Mass., has removed its Detroit office from 6526 Cass Ave. to Room 3-245 General Motors Bldg. T. C. McDonald is manager of this office.

The Crane-Kaschak Lockwasher Co., of Bristol, Conn., has been incorporated in Connecticut to engage in the manufacture of lockwashers, bolts, nuts and the like at Bristol. James A. Crane, Anthony H. Kaschak and E. Peck are the incorporators.

The Wells Tap and Die Co. has been formed in Greenfield, Mass. F. E. and F. O. Wells, for many years associated in Wells Bros. & Co., which recently merged with the Greenfield Tap and Die Corporation, are president and vice-president, respectively of the new company. W. S. Howe is treasurer and F. W. Wells is secretary. A plant soon will be opened for the manufacture of taps and dies and machine tools.

Canton and Cleveland men have purchased an interest in the Union Metal Manufacturing Co., of Canton. The control of the company goes to a group of steel men headed by Harry R. Jones, R. V. Mitchell, Charles W. Wild, R. L. Rice and a number of Cleveland people including John Sherwin, chairman of the board of the Union Trust Co.

C. C. Barrick, who has served as president for a number of years, will retain membership on the board of directors and continue to act as president. H. C. Drumm, superintendent, will remain in charge of plant operations.

Announcement is made of the purchase of the Homer Engineering Co., of Canton, Ohio, by H. V. McCarty and Frank Valley. The plant name will be changed to the Canton Automotive Engineering and Sales Co. Mr. McCarty has been connected with the company for the past twenty years. Mr. Valley has been chief mechanic at the plant for some time.

The Dunning Compressor Co., of Holmesburg, Philadelphia, Pa., manufacturer of air compressors, is adding a new addition to the present plant to take care of expansion. The new addition is to be completed by July 1, and will be equipped with modern machinery and will be given over to automotive production.

The Allen-Bradley Co., manufacturer of electric controlling apparatus with general offices and factory at Milwaukee, Wis., has recently moved its Chicago office to 20 West Jackson Blvd. The office is in charge of Frank L. Gohl, district manager.

The Briggs Manufacturing Co., of Detroit, has purchased the Meldrum Ave. plant of the American Auto Trimming Co. The Briggs company has also purchased the Waterloo Ave. plant of the Timken-Detroit Axle Co., as a preliminary step in a policy of expansion. President Walter O. Briggs states that the outlook for business for the balance of the year is exceptionally good. Changes in factory equipment incidental to handling new lines of motor bodies are practically completed, and the plants are now working to capacity.

The Business Barometer

This week's outlook in Commerce, Finance, Agriculture and Industry based on current developments

By Theodore H. Price
Editor, *Commerce and Finance, New York*

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ABOUT this time ten years ago the newspapers were publishing lengthy descriptions of a great battle that extended all the way from the Belgian coast to Arras.

Today baseball and war on the bootleggers comprise the front page news. The comparison emphasizes the changes that have occurred within a decade and if it were extended to include the difference between business conditions now and then it would be even more striking.

The seas of business are in fact so smooth and the breezes are so gentle that one would be almost inclined to advise preparation for the storm that always succeeds the calm were it not that the barometer is rising and every one is agreed that we are in for a long spell of fair weather.

This is indicated by the stock market, where there is increased activity at rising prices, as well as by the weekly statement of the Federal Reserve System, which shows a reduction of $28,000,000 in earning assets and a reserve ratio of 77.8 per cent despite the loss of $19,000,000 in gold.

It is taken for granted that these figures mean continued ease in the money market and upon this theory the professional speculators are buying stocks in the expectation that they will soon be able to unload their holdings on an unprofessional and blindly emotional public. The railroad stocks and those of the hydro-electric power companies have been the favorites. But there is always some new fashion in stock speculation and just now the stocks of certain large fire insurance companies are fashionable novelties because some profess to have discovered that the "equities" in their "reinsurance reserves" have not hitherto been reflected in the selling prices.

The one thing and in fact about the only thing that need give any concern at present is the possibility that the ease of money will bring about a condition of speculative distension in the security market and that it will be followed by another collapse like the one that occurred last March.

Therefore it is again in order to point out that the Interstate Commerce Commission has not yet approved a single one of the many railroad consolidations that have been planned; that the demand for lower railway rates is daily becoming more audible; that the passenger traffic on many railways is decreasing and that the prices at which some of the light and power securities are selling assume the indefinite and uninterrupted maintenance of present earnings.

But in the commodity markets there is no sign of the speculative revival that seems to impend on the Stock Exchange. On the Chicago Board of Trade the trading in May wheat is gradually subsiding and until opinion with regard to next year's grain crops has crystallized quietude may be expected. It is too early to prophesy about corn, but wheat, rye and oats seem to be selling at about their commercial value.

Cotton is entering upon the crop killing season, during which erratic fluctuations may be expected. The demand for "spots" has been reflected by the purchases of May delivery reported in New York, New Orleans and Chicago. Tenders are being promptly taken up and the market appears to rest upon a basis that is very substantial.

Sugar is unchanged, but the Cuban centrals are closing down rapidly and higher prices seem probable as stocks decrease.

Coffee is up about 400 points from the bottom on short covering and some speculative buying. The theory is that the Brazilians can and will be able to ration the supply and sustain prices. But the American distributors appear to be unafraid of the artificial scarcity threatened and they remain stolidly aloof.

The demand for tea is meantime improving and prices are higher in London.

Rubber has been up to 71 cents and down to 60. Such sensational fluctuations make the market dangerous and must check consumption.

Silk is higher. So are cotton goods; woolen fabrics are moving rather more freely although the market for raw wool is still erratic. There is some improvement in the demand for steel and the non-ferrous metals, but the market for copper continues to fluctuate within the limits fixed by a few large producers.

Of all the managed markets (and their number is increasing) the copper market appears to be the best managed. It has been held at between 13 and 14 cents for many months past.

Sterling has sold as high as 4.86½ and great Britain is gaining gold instead of losing it as many feared she would. The effect upon British trade has been tonic and the resulting cheerfulness appears to be felt throughout Europe. In France great indignation is expressed because our government has suggested the time has come to fund the Allied debts to the United States. A slight decline in the New York value of the French franc is attributed to this suggestion, but the correlation seems remote as it is unlikely that France will be able to pay her debt to this country for many years to come.

In an academic sense the subject is an interesting one, but as a practical and political question it is irritating and when we threaten to coerce our debtors by denying them the right to borrow here we forget one of the petitions in a prayer that is in daily use throughout Christendom. Nothing is more unprofitable than an effort to collect money from a debtor who cannot pay and by pressing for the collection of these war time loans inopportunely we may unnecessarily complicate a foreign situation that is otherwise very promising.

What's Doing in Industry

The barometer this week shows a rising trend in business all over the country, and forecasts continued improvement as long as the markets keep free of speculative elements.

Machine tool markets continue to show improvement. Industrial customers are busy and have bought machinery and equipment quite generously during the past week.

In the South the textile industries are working to capacity and are buying additional equipment. Building has also taken a spurt and machinery for contractors and construction engineers is selling in this market.

Up through New England a stabilization of credits has had a stimulating effect on business and good orders have been received from the automotive trade.

In the Middle-West the greatest activity is found, railroads and automobile interests showing more inclination to buy.

In Detroit employment has reached the normal figure and indications are that it will continue through the summer months.

The Eastern market reports better business from foreign buyers, special machines of a high production nature being in demand.

The general impression among all dealers in our lines is that the second half of the year will see an expansion in industry that can only mean better business for everyone.

The Industrial Review

Progress of the machinery and machine-tool business in various parts of the country

THE following reports gathered from the various machinery and machine tool centers of the country, indicate the trend of business in these industries and what may be expected from the future:

New England

The automotive industry is furnishing a fine volume of business for machinery builders in the machinery belt of New England, the direct and indirect trade holding up splendidly. In fact the business already in hand, and that in prospect, furnishes reasons for a widespread feeling of optimism now prevailing and this branch of industry is expected to furnish the active trade in New England for some time to come.

Inquiries now being received are indicative of a big volume of business which is judged to be of the replacement variety. Standard products are in better demand. A good volume of business that ultimately finds its way into the automotive industry is reported in Hartford, New Britain and Springfield. This business is for parts and accessories, and so the concensus of manufacturers is that this section of trade promises a bright future.

A good feeling prevails among credit men of industries in this section in consequence of the prompt payments for deliveries. A credit manager states that the requests for extensions are not as numerous as a year ago, and as compared with five years ago are practically nothing.

The labor situation at the present time is satisfactory. Machinery builders are hiring help and find themselves in a position to "pick" help. There is no great surplus of help, in fact it is difficult to find well qualified mechanics in some branches.

Export business continues large. A manufacturer of standard products says that his company's business has been improving steadily since Jan. 1, every month showing improvement. The orders are coming through exporters. Judged from quotations sought the export business is going to continue on a rising curve for several months.

New York

The best that can be said of the machine tool situation in the New York market during the closing days of May, is that it has shown a decided tendency to pick up, both as to new inquiries and also actual purchases.

The month of April slowed up business after a three-month's season of activity, but May has developed to the satisfaction of most of the leading factors in the trade. Many are of the opinion that this improvement is the natural reaction to the boom times that were started immediately after the Fall elections, when everyone predicted and really expected a great revival in all lines of trade. That this did not materialize is quite evident; but it is the opinion of many that we are to enjoy much better business in the second half of this year, due in part to the postponement of a heavy business inflation in the first half.

Industrial customers are the best buyers of machine tools and shop equipment right now. Railroads have opened up to some extent, but most of the business coming from this source is on a hand-to-mouth basis and does not cause any appreciable stir in the trade. It is reported that the D. L. & W. is about to place orders for machine tools listed several weeks ago, but the order is not expected to be as large as was indicated by the inquiry.

The market for cranes, trucks and other kinds of industrial equipment and for contractors' machinery has come up during the past ten days and several good orders were reported for this class of machinery.

The foreign market offers a rather encouraging prospect to dealers in the district. One agency in New York which handles a variety of business for Russian clients, reported that it had placed an order this week for thirty-two milling machines of a prominent make. Another order was received for a quantity of drilling machinery and equipment to be used in the oil fields now being developed with the assistance of American capital. The railroads and automotive industries in Russia are getting down to business and are partial to American machines and equipment, according to this agency, but the one drawback to the development of this business is the necessity of granting long-term credits, as the country is not yet financially stable.

Southern District

With general business conditions continuing to note a steady improvement in all parts of the South, machine tool and equipment sales during the first half of May were very active, larger distributors reporting a respectable increase over the corresponding period in 1924, and stating that inquiries are sufficiently heavy to indicate that sales will continue to show improvement for the next several weeks.

A tangible evidence of this is noted in recent reports by the South's primary industries, which it will not come amiss to briefly mention here.

Lumber mills are producing heavily but orders the past month have been 10 to 12 per cent greater than production. Textile industries are producing on a basis 15 to 25 per cent greater than last year, with cotton cloth orders approximately 100 per cent greater than last year.

This is just an evidence of what most of the keynote industries in the South report within the past two weeks, covering current conditions.

Most of the present buying in machinery and mill supplies is by the above industries, while the railroads and service stations continue actively in the market for tools, the latter buying heavily of lathes, drill presses, cylinder grinding machines, etc., but mostly in used or rebuilt equipment, which seems to be heavier this year than it has been in the past four or five seasons.

Inquiries for heavier equipment from railroads the past two weeks have been as active as ever, and sales are holding up on about the same basis as in April.

And that the automotive industry in the North is contemplating increased production is seen in reports by hardwood manufacturers in the Atlanta market that thicker ash, maple and elm dimensions have been in the heaviest demand to this consuming source the past two weeks of any time in almost a year.

Inquiries from textile mills are particularly active at this time, and summer sales to this source will very likely considerably better the volume enjoyed last year by Southern distributors, due to the large amount of new textile mill construction in progress in the Southeast.

Chicago

The Chicago machine tool market continues quiet. Such dealers as have made bids on railroad equipment are awaiting awards with some impatience, the continued delay on the part of the roads which have asked for and have received bids for equipment having something of an exasperating effect. This is not diminished by information recently given out that some of the roads are curtailing on their budgets for special machinery and machine tools.

A specific instance is that of the C. B. & Q. Railroad which has cut its appropriation of $200,000 for machine tools to $60,000, the difference of $140,000 having been diverted to other equipment uses. It is now said to be questionable whether the smaller sum will be wholly devoted to machine tool buying. There are encouraging reports that the larger railroad buyers will announce their decisions not later than a week hence.

Few sales of any importance have been noted during the last week, the purchase of five hand screw machines by the Wilde Company, of Peoria, being among those reported. Such demand as has materialized has been

mainly for used machinery, inquiries for new equipment being infrequent. Optimistic forecasts of better business conditions continue to be issued by bankers and others in close touch with industry, who furnish figures, mostly showing comparisons with former years, to prove the reason for their optimism. They admit, however, that present buying is confined to immediate wants in all lines.

Philadelphia

A decided change for the better was noted in the industrial activities throughout the Philadelphia market this week. Some inquiries from railroad companies which have a decidedly favorable tone have been received by some of the manufacturers, and industrial conditions generally are very much improved.

The Chesapeake & Ohio Railroad has asked for prices on some tools, and the demand for small tools has increased considerably. A number of inquiries have been received from other roads and industrial activities generally indicate a return to more normal conditions. Manufacturers of small tools say they have a more encouraging outlook now than they have had for weeks.

Generally speaking there is a much more optimistic view of the situation now than there has been at any time this year. Representatives of large manufacturers assert, however, that they are experiencing some difficulty in closing at the prices asked.

In most of the industrial lines manufacturers say they have sufficient orders ahead to keep their plants going during the summer months.

In the used tool line business was described as spotty, with a more favorable aspect than the dealers have had for some months.

Indianapolis

Little change is reported in demand either for tools or metal working machinery. The situation, as described by manufacturers and dealers in this city, is considerably spotted with gains in demand from certain industries and decreases in others. However, even with the situation as it has been since the first of the year, the trade here expects the first half of the present year to see more business done than during the same period of last year.

Probably the brightest spot in the entire field here is the increasing demand from the automobile industry, both for tools and machinery. Some plants are operating nearly to capacity, something that has not occurred for many months. However, nothing is being purchased that is not absolutely necessary to the operation of plants. The demand both for tools and machinery from the farm implement factories at Evansville, Laporte and South Bend also is very good.

Purchases on the part of interurban utilities of special machinery are confined to absolute requirements. The same may be said of the railroads where sales of tools have been light for the last month. A good demand is coming from the fabricating plants catering to the construction industry and this demand is expected to keep steady during most of the summer.

Dealers in used machinery report only a fair business. They say one of the great difficulties is in securing the machinery wanted by their prospective customers.

Milwaukee

While it cannot be said that the demand for metalworking equipment is anything like brisk, the trend of business is quickening after having proceeded rather sluggishly for about two months. The automobile industry is principally responsible for the better demand and improved feeling, for it has been able to speed up its production, purely on the basis of the ability of the country to absorb the output, in a degree beyond earlier expectations. The machine tool trade does not expect the automobile factories to buy a large volume of equipment for the present, but it feels grateful that the industry has improved its position to the extent that has now become apparent.

Inquiry from the agricultural machinery industry is such that hopes of a fairly active business for tool manufacturers are growing brighter. Farm implement factories as a rule are concerned mainly with the question of effecting economies, and requirements of metalworking equipment are limited to the replacement of obsolete or worn-out tools, rather than any urgent need for more capacity. The industry has a long way to go before it can hope to find necessary the taking of steps to provide additional capacity, although it is not unlikely that a few of the principal plants in the tractor field will be straining at their existing facilities in the not distant future.

Some fair sales of metalworking equipment are being made to the shops which manufacture machinery for woodworking in its many phases. Automobile body builders are among the best buyers.

Local machine tool makers reported a good response to their merchandising activities in connection with their exhibits at the Mid-West Power Show, held in Milwaukee in conjunction with the annual spring convention of the American Society of Mechanical Engineers, and the refrigerating and stationary engineering societies as well. The sentiments growing out of this activity point toward a more hopeful attitude on the part of the engineering talent of the country respecting business in machinery in the immediate and distant future.

Cincinnati

The trend of business in the machine tool trade has continued to be upward during the past week, but none of the manufacturers or retailers in this territory report a large increase in demand. The majority of the manufacturers feel encouraged by the steady improvement in trade conditions because it shows that there is no tendency for things to take a turn for the worse. Retailers report slight increases in sales, the greater part of the demand being for small tools.

Railroads have done some buying, both of large and small tools, and they are continuing to send in a fair number of inquiries. Orders continue to come in from the automotive industries, and buying from this source has extended farther into the spring than usual. The sugar industry has made a few purchases, but no sales are reported to the textile industry.

What buying there has been during the past week has come from all sections of the country, with no tendency toward localization. The demand for replacements continues to show a gradual increase, which is taken as an indication that users of machine tools all over the land are becoming busier than they have been.

Machine tool manufacturers and retailers, as well as those in other lines, state that they find more than a grain of comfort in the current optimistic reports in regard to business conditions in general. The industrial condition is pronounced safe and sane. European conditions are steadily improving, with every prospect for business from that source. At no time during the past five years, it is pointed out, have conditions been as favorable as they are now.

Detroit

Continued consolidations of automobile and accessory plants in Detroit and southeastern Michigan have served to keep the market for machinery and machine tools at a fairly uniform stage.

Reports from the leading representatives indicate a healthy demand for special machinery of the types used in motor car plants, and satisfactory sales in small tools. Used machinery is not in such demand as some time ago, but electrical equipment is being purchased quite extensively. .

Railroads are doing more buying just at present than for some time past, especially the Michigan Central and the Pere Marquette. The Pennsylvania's extensions down river are expected to result in some large purchases for tools and machinery. Employment continues to mount, according to figures of the Employers' Association of Detroit, and is close to the high figure of all time in Detroit.

Machinery Exports Increased Last Year

Exports of industrial machinery from the United States in 1924 amounted to $130,836,318, and were well over $7,000,000 greater in value than the previous year, when they totaled $123,500,000, according to the industrial division of the Department of Commerce. Shipments of this classification had valuations of $112,289,000 in 1922.

Experience shows that American exporters very commonly consider Europe the most important group of export markets, but it will be noted that last year the markets of Latin America absorbed more than one-third of our total machinery exports, while the volume to Europe was slightly less than one-fourth of the total. Also, our Latin American trade is growing, for the volume increased about $8,600,000 to $43,500,000, as compared with 1923.

Personals

WALTER D. BRIGGS, formerly associated with Henry Prentiss & Co., Inc., has joined the sales staff of the Crane-Schiefer-Owens Co., Inc., of Buffalo, and will be stationed at that company's Syracuse office.

C. G. KELLOG, formerly superintendent of the United Alloy Steel Corporation, Berger Division, Canton, Ohio, has become affiliated with the Cleveland Duplex Machinery Co., Inc., as sales engineer.

R. E. NELLES, for the past three years connected with the tramrail division of the Cleveland Crane and Engineering Co., as New York manager, has joined the sales organization of the Reading Chain and Block Corporation, of Reading, Pa. He will represent this company in the New York and New England districts.

J. F. STONEY has resigned as general manager of the Ferro Machine and Foundry Co., of Cleveland, Ohio. He will devote his future efforts to experimenting in molding and coremaking in the interests of the Stoney Engineering Co., of which he is the head. He will continue as a vice-president and director of the Ferro organization.

F. W. PARKS is now sales manager of the Brake Tester Department at the C. H. Cowdrey Machine Works, Fitchburg, Mass.

THOMAS J. FITZGERALD has severed his partnership with the Fitzgerald Forging & Heat Treating Co. of Springfield, Mass.

H. D. CHURCH, formerly chief engineer of the truck department of the Packard Motor Car Co., and for the past 18 months assistant chief engineer of the Chevrolet Co., went to the White Motor Co. on May 15, as director of engineering.

GEORGE W. SMITH, formerly in charge of the experimental and research departments of the White Motor Co., has returned to the company as technical assistant to the vice-president and general manager, and will have charge of the technical division of the staff.

W. A. GOWING, of the W. A. Gowing Co., 620 East Hancock Ave., Detroit, Mich., has been appointed Michigan representative of the Universal Steel Co., of Bridgeville, Pa.

C. H. BRIGGS, formerly associated with the Garvin Machine Co., has joined the sales staff of the National Automotive Tool Co., of Richmond, Ind.

R. R. JAVENS has been appointed sales manager of the Alvord Reamer and Tool Co., of Millersburg, Pa.

FRANK BURGESS has been elected president of the Boston Gear Works, Inc., Norkfolk Downs, Mass. Mr. Burgess has been associated with this company for many years and at the present time is general manager. He will continue in that capacity.

Automotive Engineers Plan Cleveland Meeting

A meeting of the committee for the production meeting of the Society of Automotive Engineers was held in Cleveland, Ohio, Tuesday, May 19, at which were present John A. C. Warner, representing the society, John Younger, Associate Editor, American Machinist, Eugene Bouton, A. H. Frauenthal of the Chandler Motor Car Co., J. H. Teachout of the White Motor Co., and W. S. Bidle, president of the American Society for Steel Treating.

This meeting gave final approval to the plans for the Society of Automotive Engineers' production meeting to be held in Cleveland in September.

Obituaries

GEORGE SMART, the well-known managing news editor of the *Iron Age*, died on May 16 at the age of 61. Mr. Smart was active in all matters pertaining to business papers, being a member of the executive committee of the National Conference of Business Paper Editors. He had also served as chairman of the Editorial Conference of the New York Business Papers Association, as well as having been president of the Ohio State University Alumni and president of the Community Council of Forest Hills, L. I., where he resided.

At the time of his death he was president of the Men's Club of Forest Hills and chairman of the Student Aid Endowment Fund of the Phi Kappa Psi fraternity. A memorial service has been planned by his friends and neighbors to be held jointly by the Men's Club, Mr. Smart's fraternity and the members of the staff of the *Iron Age*.

Mr. Smart was very popular with his many friends and business associates, and his cheery personality will be sadly missed.

GEORGE A. TRUE, founder and former president of the Northern Engineering Works, Detroit, and of the Northern Crane Works, Ltd., of Walkerville, Ont., died at his home in Detroit recently at the age of sixty-two.

J. DALLAS DORT, former president of the Dort Motor Car Co., of Flint, Mich., died suddenly on May 17. Mr. Dort was 64 years old. As president of the Dort Motor Car Co., Mr. Dort became one of the leading figures of the automobile world. He became associated with W. C. Durant in 1886, when the two started a business in a small shop. They branched into the carriage business under the name of the Durant-Dort Carriage Co. Later the Dort Motor Car Co. grew out of the carriage industry.

CHARLES POPE, retired as active manager of the Sharon, Pa., plant of the National Malleable Steel Castings Co., died in Cleveland on May 15.

WILLIAM FULLARTON, engineer assistant to the vice-president of Dodge Bros., Inc., died suddenly of heart trouble recently. He was 40 years old.

Calendar of Local Meetings

American Society of Mechanical Engineers

Birmingham, Ala. June 16. Inspection of mills. Avondale Cotton Mills.

Philadelphia, Pa. June 16. Joint outing with A. I. E. E.

Atlanta, Ga. June 18. Supper meeting and election of officers.

Denver, Col. June 26. Regular business meeting and election of officers. Excursion to radio stations in Denver.

Portland, Ore., June 22 to 25. Pacific Coast Regional Meeting.

American Society for Steel Treating

Schenectady, N. Y. Spring Section Meeting. May 28, 29 and 30. Hotel Van Curler. W. H. Eisenman, secretary, 4600 Prospect Ave., Cleveland, Ohio.

National Association of Cost Accountants

Milwaukee Chapter. June 9. Annual banquet.

Philadelphia Chapter. June 12. Subject: "Advertising Budget." How it is lined up and operated. Who pays for it?

Twin Cities. June 11. "Cost of Government." Annual election of officers.

Western Massachusetts. June 23.

Worcester. June 11. "Applied Economics."

Detroit Chapter. May 21. "Experience in Simplifying the Cost System."

Forthcoming Meetings

National Association of Cost Accountants. Sixth international cost conference, Detroit, Mich., June 15, 16, 17 and 18. Headquarters at Hotel Statler. Secretary, Stuart C. McLeod, 130 West 42nd Street, New York City.

Division V of the American Railway Association. Business meeting June 16 to 18, Chicago. V. R. Hawthorne, 431 S. Dearborn St., Chicago, Ill.

Society of Automotive Engineers. Summer Meeting. Greenbrier Hotel, White Sulphur Springs, W. Va., June 16, 17, 18 and 19. C. F. Clarkson, secretary, 29 West 39th St., New York City.

American Society for Testing Materials. Twenty-eighth annual meeting. Chalfonte-Haddon Hall Hotel, Atlantic City, N. J., June 22, 23, 24, 25 and 26. C. L. Warwick, secretary-treasurer, 1315 Spruce St., Philadelphia, Pa.

National Foreign Trade Council. Annual Convention. Seattle, Wash., June 24, 25 and 26. O. K. Davis, secretary, India House, Hanover Square, New York City.

American Railway Tool Foremen's Association. Annual convention, Hotel Sherman, Chicago, Ill., in August. G. G. Macina, C. M. & St. P. Ry., 1402 Calumet Ave., Chicago, Ill.

International Railway General Foremen's Association. Annual convention, Hotel Sherman, Chicago, Sept. 8, 9, 10 and 11. William Hall, secretary and treasurer, 1061 W. Wabash St., Winona, Minn.

New Haven Branch of the American Society of Mechanical Engineers. Fifth annual machine tool exhibition. Sept. 8 to 11. Mason Laboratory. H. R. Westcott, chairman.

American Society for Steel Treating. Annual Convention and National Steel Exposition. Public Auditorium, Cleveland, Ohio. Week of Sept. 14. W. H. Eisenman, Secretary, 4600 Prospect Ave., Cleveland, Ohio.

The Weekly Price Guide

Rise and Fall of the Market

Iron and Steel—Buying is moderate in the iron market with slight improvement in tone; prices unchanged; no further slowing down in production reported. Iron and steel scrap firmer. Demand a trifle better in pipe, tin plates and steel sheets. Minimum on steel shapes and plates, $1.90 per 100 lb., Pittsburgh; bars, $2 per 100 lb. This represents a drop of about 10c. per 100 lb. in week on structurals. Maximum mill quotation of $2.10 per 100 lb. on principal hot rolled products, applies mostly to small tonnages.

Non-Ferrous Materials—Upward trend is apparent in most of the non-ferrous metals. In New York warehouses zinc is ¼c., lead, ⅜c. and tin, 1¼c. per lb. above May 15 levels. In Cleveland, antimony rose 3c. per lb. in week. Copper is fairly firm at present level. Such items as brass rods, solder, cotton waste, machine oil and belting are all higher than a year ago.

(All prices as of May 22)

IRON AND STEEL

PIG IRON—Per gross ton, f.o.b.:

CINCINNATI	
No. 2 Southern	$24.05
Northern Basic	23.27
Southern Ohio No. 2	23.27
NEW YORK—Tidewater Delivery	
Southern No. 2 (silicon 2.25@2.75)	27.37
BIRMINGHAM	
No. 2 Foundry	22.00
PHILADELPHIA	
Eastern Pa., No. 2x (silicon 2.25@2.75)	24.26
Virginia No. 2	29.17
Basic	23.26
Grey Forge	23.75
CHICAGO	
No. 2 Foundry local	23.00
No. 2 Foundry, Southern (silicon 2.25@2.75)	26.55
PITTSBURGH, including freight charge ($1.76) from Valley	
No. 2 Foundry	23.77
Basic	23.77
Bessemer	23.77

IRON MACHINERY CASTINGS—Cost in cents per lb. of 100 flywheels, 6-in. face x 24-in. dia., hub not cored, good quality gray iron, weight 275 lb.:

Detroit	4.75
Cleveland	4.75@5.00
Cincinnati	5.00@7.50
New York	5.00@5.50
Chicago	5.25@5.75

SHEETS—Quotations are in cents per pound in various cities from warehouse; also the mill base in large lots.

Blue Annealed	Pittsburgh Mill Base	New York	Cleveland	Chicago
No. 10	2.40@2.50	3.89	3.35	3.80
No. 12	2.45@2.55	3.94	3.40	3.85
No. 14	2.50@2.60	3.99	3.45	3.95
No. 16	2.60@2.70	4.09	3.55	4.15
Black				
Nos. 17 to 21	2.95@3.30	4.15	4.05	4.30
Nos. 22 to 24	3.00@3.35	4.20	4.10	4.35
Nos. 25 and 26	3.05@3.40	4.25	4.15	4.40
No. 28	3.15@3.50	4.35	4.25	4.50
Galvanized				
Nos. 10 and 11	3.25@3.60	4.35	....	4.50
Nos. 12 to 14	3.35@3.70	4.45	....	4.60
No. 16	3.50@3.85	4.60	....	....
Nos. 17 to 21	3.65@4.00	4.75	....	4.90
Nos. 22 to 24	3.80@4.15	4.90	4.90	5.05
No. 26	3.95@4.30	5.05	5.05	5.20
No. 28	4.25@4.60	5.35	5.35	5.50

WROUGHT PIPE (Welded)—Warehouse discounts are as follows:

	New York		Cleveland		Chicago	
	Black	Galv.	Black	Galv.	Black	Galv.
1 to 3 in. steel butt welded	53%	39%	55½%	43½%	59½%	48%
3½ to 6 in. steel lap welded	48%	35%	53½%	40½%	56½%	45%

Malleable fittings: Classes B and C, banded, from New York stock sell at list plus 4%, less 5%; class A, plus 23%. Cast iron, standard sizes, 36% off.

Size, Inches	List Price per Foot	Diameters Inches External	Diameters Inches Internal	Thickness Inches
1	$0.17	1.315	1.049	.133
1¼	.23	1.66	1.38	.14
1½	.27½	1.9	1.61	.145
2	.37	2.375	2.067	.154
2½	.58½	2.875	2.469	.203
3	.76½	3.5	3.068	.216
3½	.92	4.0	3.548	.226
4	1.09	4.5	4.026	.237
4½	1.27	5.0	4.506	.247
5	1.48	5.563	5.047	.258
6	1.92	6.625	6.065	.28

SEAMLESS STEEL TUBING—Following base discounts are on 20 gauge or .035-in., round, cold-drawn tubing, ¼-in. to 1-in., O.D., weighing 0.17 lb. to 0.36 lb. per ft. Cutting charge per 100 cuts, $1.50 to $1.58:

O.D. Inches	List Price per ft.	Differential Discount	O.D. Inches	List Price per ft.	Differential Discount
¼	$0.09	50%	⅞	$0.16	35%
⅜	.11	45%	1	.18	31%
½	.14	40%			

NOTE—The discounts are to be lowered by the following differentials in the case of regular .10-.20 carbon: 25,000 ft. or over, 83; 15,000 to 25,000 ft., 82; 5,000 to 15,000 ft., 81; 1,000 to 5,000 ft., 80; less than 1,000 ft., 79.

MISCELLANEOUS—Warehouse prices in cents per pound in 100-lb. lots:

	New York	Cleveland	Chicago
Open hearth spring steel (base)	4.50	6.00	4.20
Spring steel (light) (base)	7.00	6.00	6.00
Coppered Bessemer rods (base)	6.05	8.00	7.20
Hoop steel	4.49	3.85	4.15
Cold rolled strip steel	6.35	8.25	7.85
Floor plates	5.55	5.60	5.50
Cold drawn shafting or screw	4.15	4.00	3.80
Cold drawn flats, squares	4.65	4.50	4.30
Structural shapes (base)	3.34	3.20	3.10
Soft steel bars (base)	3.24	3.10	3.00
Soft steel bar shapes (base)	3.24	3.11	3.00
Soft steel bands (base)	3.99	3.20	3.65
Tank plates (base)	3.34	3.40	3.10
Bar iron (3.00 at mill)	3.24	3.21	3.00
Drill rod (from list)	60%	55%	50%

Electric welding wire, New York, 3/32, 8.25c.; ⅛, 7.85c.; 5/32 to ¼, 7.35c. per lb. Chicago, 3/32, 8.85c.; 5/32, 7¾c.; ⅛, 7.95c. per lb.

METALS

Current Prices in Cents Per Pound

Copper, electrolytic (up to carlots), New York			14.12½
Tin, 5-ton lots, New York			56.50
Lead (up to carlots), St. Louis	8.00	New York	8.75
Zinc (up to carlots), St. Louis	6.95	New York	7.87½

	New York	Cleveland	Chicago
Antimony (Chinese), ton spot	18.00	19.00	14.00
Copper sheets, base	21.75	21.75	22.00
Copper wire, base	19.25	21.25	20.00
Copper bars, base	20.87½	21.50	22.50
Copper tubing, base	23.75	24.25	24.00
Brass sheets, base	18.12½	18.62½	18.37½
Brass tubing, base	22.75	25.25	26.00
Brass rods, base	15.87½	16.37½	18.37½
Brass wire, base	18.62½	20.12½	20.00

Shop Materials and Supplies

METALS—Continued

	New York	Cleveland	Chicago
Aluminium ingots, 98 to 99%, 1–15 ton lots	28.00	28.00	27 00
Zinc sheets (casks)	11.00	11.25	11.37
Solder (½ and ½), (case lots)	39.50	36.50	....
Babbitt metal (83% tin)	60.00	65 00	50.00
Babbitt metal (35% tin)	28.00	20. 50	28.00
Nickel (ingots) f.o.b. refinery	31.00	. .	.
Nickel (electrolytic) f.o.b. refinery	38.00	. .	. .
Nickel (shot) f.o.b. refinery	32.00	...	.....

SPECIAL NICKEL AND ALLOYS—Price in cents per lb., f.o.b. Huntington, W. Va.:

Hot rolled nickel sheet (base)	52.00
Cold rolled nickel sheet (base)	60.00
Hot rolled rods, Grade "A" (base)	50.00
Cold drawn rods, Grade "A" (base)	58.00
Manganese nickel hot rolled rods "E"—low manganese (base)	54.00
Manganese nickel hot rolled rods "D"—high manganese (base)	57.00

Base price of Monel Metal in cents per lb., f.o.b. Huntington W. Va.:

Shot	32.00	Hot rolled rods (base)	40.00
Blocks	32.00	Cold drawn rods (base)	48.00
Ingots	38.00	Hot rolled sheets (base)	42.00
Cold rolled sheets (base)			50 00

OLD METALS—Dealers' purchasing prices in cents per pound:

	New York	Cleveland	Chicago
Crucible heavy copper	11.00@11.50	11.25	10 25
Copper, heavy, and wire	10.75@11.00	11 00	10 25
Copper, light, and bottoms	9.25@ 9.75	9.00	9 00
Heavy lead	6.25@ 6.50	6.25	6.50@6.75
Tea lead	5.25@ 5.50	3.75	5.50@5.75
Brass, heavy, yellow	6.75@ 7.25	6.50	7.00
Brass, heavy, red	8.50@ 8.75	8.75	8.00
Brass, light	5.75@ 6 00	5.50	6.00
No. 1 yellow rod turnings	7.25@ 7.50	7.00	7.75
Zinc	4.00@ 4.25	3.50	4.00

TIN PLATES—American Charcoal—Bright—Per box.

		New York	Cleveland	Chicago
"AAA" Grade:				
IC,	14x20	$11.25	$11. 45	$11. 00
"A" Grade:				
IC,	14x20	8.85	9. 40	8 50
	Coke Plates—Primes.			
100-lb.,	14x20	6.50	6. 10	6.50
	Terne Plates—Small lots, 8-lb. Coating			
IC,	14x20	7.25	6.95	6.75

MISCELLANEOUS

	New York	Cleveland	Chicago
Cotton waste, white, per lb.	$0. 15@0. 22	$0.19	$0.14
Cotton waste, colored, per lb.	. 10@ .15½	.18	.09½
Wiping cloths, 13¼x13¼, per lb	.17	36. 00 per M	. 11*
Wiping cloths, 13¼x20½, per lb.	....	45. 00 per M	. 11*
Sal soda, per 100 lb. keg	2. 25	2. 25	2. 00
Roll sulphur, per 100 lb. keg	3. 60	3. 75	2. 85
Linseed oil, per gal., 5 bbl. lots	1. 09	1. 21	1. 26
Lard cutting oil, 25% lard, per gal.	. 55	. 50	. 32
Machine lubricant, medium-bodied (50 gal. wooden bbl.), per gal.	35	. 35	. 21
Belting—Present discounts from list in fair quantities (½ doz. rolls).			
Leather—List price, 24c. per lin. ft. per inch of width for single ply.			
Medium grade	30–10%	30–10%	30–10%
Heavy grade	20–5%	20–5%	20–5%
Rubber transmission, 6-in., 6 ply, $1.83 per lin. ft.			
First grade	50–5%	50–10%	60%
Second grade	50–10–5%	60–5%	65%

*White, at washery.

Comparative Warehouse Prices

New York	Unit	Current Price	Four Weeks Ago	One Year Ago
Soft steel bars	per lb.	$0.0324	$0 0324	$0 0349
Cold finished shafting	per lb.	0415	0415	044
Brass rods	per lb	.1587½	.1587½	.145
Solder (½ and ½)	per lb.	.395	.37	3475
Cotton waste	per lb.	.15@.22	.15@.22	14@21
Washers, cast iron (¼ in.)	per 100 lb.	7.00	7.00	6.50
Emery, disks, cloth, No. 1, 6 in. dia.	per 100	3 38	3.38	3.38
Lard cutting oil	per gal.	.55	.60	.55
Machine oil	per gal.	35	33	29
Belting, leather, medium	off list	30–10%	30–10%	40–2½%
Machine bolts up to 1x30 in.	off list	40%	40%	50%

MISCELLANEOUS—Continued

	New York	Cleveland	Chicago
Abrasive materials—In sheets 9x11 in., No. 1 grade, per ream of 480 sheets:			
Flint paper	$4. 86	$5. 84	$5.00
Emery paper	10. 71	11. 00	11. 00
Emery cloth	28. 00	31. 12	32. 75
Emery disks, 6 in. dia., No. 1 grade, per 100:			
Paper	1. 49	1. 24	1. 50
Cloth	3. 38	2. 67	3 55
Fire clay, per 100 lb. bag	...	.65	. 75
Coke, prompt furnace, Connellsville	per net ton		3. 00@3. 25
Coke, prompt foundry, Connellsville	per net ton		3 75@4. 25
White lead, dry or in oil	100 lb. kegs		New York, 15.75
Red lead, dry	100 lb. kegs		New York, 15.75
Red lead, in oil	100 lb. kegs		New York, 17.25

SHOP SUPPLIES

Machine bolts, ¼x1½-in., per 100, $1.70. Discount at New York warehouses on all sizes up to 1x30-in., 40%; 1¼ and 1¼x30-in. up to 12-in., 15%; with cold punched hex. nuts up to 1-in. dia. (plus std. extra of 10%) 30%; with hot pressed hex. nuts up to 1x30-in. (plus std. extra of 10%) 35%. Machine bolts, up to 1x30-in., with cold punched and hot-pressed hex. nuts, also button head bolts with hex. nuts are $3.50 per 100 lb at Cleveland.

Carriage bolts, ¼x1½-in., per 100, $1.00. Discount on all sizes up to 1x30-in., 30%.

Coach and lag screws, 1½x$\frac{5}{16}$in., $2.25 per 100, less 40%.

Tap bolts, 1½x¼-in., $1.00 per 100. List plus 35% at New York warehouses; with hex. heads, $4.65 per 100 lb. net at Chicago.

Bolt ends, 1x12-in., 10c. per lb., less 40%.

Nuts, semi-finished, ¼x¼-in., 2c. each. Discount 70% for $\frac{5}{16}$-in. and smaller and 65% for ⅜-in. and larger.
Case hardened ¼x¼-in., 6c. each, less 50%.

Rivets, button heads, ⅜-in., ½-in., 1-in. diam.x2$\frac{1}{16}$-in. to 4$\frac{1}{16}$-in., $5.00* per 100 lb. at New York warehouses; cone heads, same sizes, $5.20* per 100 lb. Rivets, $\frac{7}{8}$x1-in. and longer, 19c. per lb., less 50%. Same discount for tinned. EXTRA per 100 lb. for 1⅛ to 2-in. long, all diameters, 25c.; ⅜-in. dia., 35c.; ½-in. dia., 75c.; 1-in. long and shorter, 75c., longer than 5-in., 50c.; less than 200 lb., 50c.; countersunk heads, 45c.

Washers, cast iron, ½-in., $7.00* per 100 lb. at New York warehouses; ⅜-in., $6.00* per 100 lb.

*For immediate delivery from warehouse.

Machine Requirements and Industrial Construction

Machine Tools and Equipment Wanted

D. C., Washington—A. L. Flint, Gen. Pur. Officer of the Panama Canal, will receive bids until June 8th for two heavy duty 30 ton shop presses, reamers, metal slitting saws, etc.

Ill., Joliet—Economy Pumping Machinery Co., 101-111 McDonough St.—3 ft. radial drill; 20 to 26 in. high speed, all geared upright drill; and 60 in. vertical boring mill.

Ind., Anderson — Ames Shovel and Tool Co., North Anderson St.—machinery for new factory.

Md., Baltimore — Pioneer Hardwood Flooring Co., Ashland Ave. and 8th St., C. F. Steiner, Pres.—machinery for the manufacture of hardwood flooring.

Md., Highlandtown (Baltimore P. O.)—A. Weiskittel & Sons Co., H. C. Weiskittel, Pres.—machinery for manufacture of gas stoves and ranges.

Mass., Boston—S. Samoriak, 343 Harrison Ave.—miscellaneous tools and equipment for repair and service garage.

Mass., Newtonville (Boston P. O.)—A. T. Stuart, 8 Winter St., Boston—miscellaneous tools and equipment for repair and service garage, Washington and Hovey Sts.

N. J., Trenton—Panelyte Board Co., D. Mason Sutherland, Pres., Enterprise Ave.—special machinery for new plant.

N. Y., Long Island City—J. J. Curran, 39—17th Ave. (machine shop)—2 in. capacity, power driven pipe threading machine.

O., Columbus—North Columbus Lumber Co., East Hudson St. and Pennsylvania R.R.—(millworkers)—18 in. woodworking lathe.

Pa., Zellonople—Atlas Sanitary Mfg. Co.—equipment for cleaning and enameling room for new plant.

R. I., Providence — American Radiator Works, 216 Aborn St.—small tools and equipment with accessory motors for garage and repair shop.

Tex., Port Arthur—Kansas City Southern Railway Co., Southern Blvd., Kansas City, Mo., B. B. Brain, Pur. Agt.—equipment for new locomotive shop, etc., here.

Va., Richmond—J. G. Skelton Co., Inc., Railway and Power Bldg.—7 ton overhead crane, 160 ft. runway, 56 ft. span.

Wis., Oconomowoc—L. Schoen, 300 Milwaukee St.—lathe and drill press for garage.

Opportunities for Future Business

Calif., Los Angeles—City awarded contract for the construction of a shop for Roosevelt High School. Noted May 14.

Calif., Tracy—West Side Garage, J. Levand, plans the construction of a garage and machine shop annex. Estimated cost $15,000.

Conn., Milldale—Clark Bros. Bolt Co., awarded contract for the construction of a 45 x 125 ft. factory addition. Estimated cost $40,000.

Conn., New Britain—Hart & Cooley Co., Inc., Corbin Ave., manufacturers of steel registers, awarded contract for the construction of a 60 x 178 ft. factory addition. Estimated cost $40,000. Private plans.

Ind., Anderson—Ames Shovel and Tool Co., North Anderson St., plans the construction of new factory buildings on North Anderson St. Estimated cost $60,000.

La., New Orleans — Cumberland Telephone and Telegraph Co., South Remdon and Gravier Sts., awarded contract for the construction of a 2 story, 80 x 80 ft. addition to warehouse and loading plant. Estimated cost $43,047. R. DuBuys, Hibernia Bank Bldg., Archt.

Md., Baltimore — Pioneer Hardwood Flooring Co., Ashland Ave. and 8th St., C. F. Steiner, Pres., plans the construction of a 1 and 2 story plant to replace fire loss. Estimated cost $100,000. Architect and engineer not selected.

Md., Highlandtown (Baltimore P. O.)—A. Weiskittel & Sons Co., H. C. Weiskittel, Pres. will build foundries and engine room, etc., by day labor here. Estimated cost $150,000. Private plans.

Mass., Cambridge (Boston P. O.)—Dunster Realty Co., c/o E. B. Stratton, Archt., 25 Arch St., Boston, awarded contract for the construction of a 70 x 120 ft. repair and service garage addition at Mt. Auburn and Boylston Sts., here. Estimated cost $60,000. Noted Apr. 23.

Mass., Great Barrington—J. T. Harper, awarded contract for the construction of a repair and service garage, at Main and Bridge Sts. Estimated cost $40,000.

Mass., Lynn—Bureau of Water Comm., will soon receive bids for the construction of a 2 story, 50 x 142 ft. shop, garage and storage building on Bennett St. Estimated cost $75,000.

Mass., Newtonville (Boston P. O.)—A. T. Stuart, c/o L. Hamburger, 8 Winter St., Boston, is receiving bids for the construction of a 146 x 150 ft. repair and service garage, here. Private plans.

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Address
BUSINESS NEWS DEPARTMENT
McGRAW-HILL CO., INC.,
10th Ave. at 36th St., New York.

Minn., St. Paul — Motor Power Equipment Co., 2512 University Ave., plans the construction of a 40,000 sq.ft. factory. Estimated cost $100,000. C. H. Johnson, 715 Capitol Bank Bldg., Archt.

Minn., St. Paul — Schurmeier — Whitney Co., 419 North 5th St., Minneapolis, is having plans prepared for the construction of a plant for the manufacture of truck bodies. Estimated cost $60,000. Toltz, King & Day, Builders Exchange, St. Paul, Archts.

Mo., Kansas City—J. H. White, 619 Lee Bldg., awarded contract for the construction of a 2 story, 116 x 149 ft. garage. Estimated cost $150,000.

Mo., St. Louis — Valley Furniture Co., 3326 North 21st St., awarded contract for the construction of a 2 story, 66 x 98 ft. addition to factory on North 21st St. Estimated cost $30,000. Private plans.

N. J., Trenton—Panelyte Board Co., D. Mason Sutherland, Pres., Enterprise Ave., plans the construction of a 1 and 2 story plant to replace fire loss. Estimated cost $100,000. Engineer and architect not selected.

N. Y., Long Island City—J. D. Johnson Co., Inc., 5th and Washington Aves., manufactures plumbing equipment and supplies, plans the construction of a 100 x 190 ft. storage and distribution building, including conveyors, loaders, etc. Estimated cost $75,000. Moore and Landsiedel, 148th St. and 3rd Ave., New York, Archts.

N. Y., Mineola—International Motors Co., 25 Broadway, New York, awarded contract for the construction of a 2 story assembling plant at Jericho Turnpike, here. Estimated cost $55,000.

N. Y., Schenectady—American Locomotive Co., 30 Church St., New York, awarded contract for the construction of addition to plant, here. Estimated cost $135,000.

O., Cleveland — Columbia Hardware Co., H. F. Seymour, Pres., 5113 Hamilton Ave., awarded contract for the construction of a 2 story, 90 x 120 ft. factory, on East 51st St. Estimated cost $50,000. Noted Mar. 26.

O., Fremont—Schaff & Good Co., plans the construction of a 2 story factory for the manufacture of cutlery products, to replace fire loss. Estimated cost $50,000.

Okla., Oklahoma City—C. W. Sims, 118 West 1st St., is having preliminary plans prepared for the construction of a 5 story, 75 x 140 ft. garage. Estimated cost $225,000. Hawk & Parr, Cotton Exchange, Archts. Reinhart & Donovan, Trademans Bldg., Engrs.

Pa., Lewistown — Viscose Co., Marcus Hook, will soon award contract for the construction of a 111 x 148 ft. machine and carpenter shop on Juniata River. Ballinger Co., 12 and Chestnut Sts., Phila., Archts.

Pa., Philadelphia—Creswell Iron Works., 23rd and Cherry Sts., awarded contract for the construction of a 63 x 84 ft., foundry at Croskey and Race Sts. Estimated cost $7,600.

Pa., Philadelphia—General Electric Co., Witherspoon Bldg., awarded contract for the construction of extensions to building No. 4 including one story and gallery 120 x 250 ft. with 23 x 142 ft. and 79 x 231 ft. wings, 56 x 58 ft. dry kiln, etc., on Elmwood Ave. between 68th and 70th Sts.

Pa., Philadelphia—G. S. Getty & Co., 1539 Cabot St., hardware manufacturers, awarded contract for the construction of a 2 story, 40 x 79 ft. factory. Estimated cost $25,000.

Pa., Philadelphia—S. Hopkins, 62nd and Market Sts., will build a 2 story, 50 x 225 ft. auto sales and service building, at 538-40 North 63rd St., by day labor. Private plans. Owner will take bids on separate contracts.

Pa., Pittsburgh—Auto Truck Equipment Co., 7511 Pennsylvania Ave., awarded contract for the construction of a 2 story factory addition on Meade St. Estimated cost $40,000.

Pa., Pittsburgh—Manchester Aurt & Machine Co., 1216 Liverpool St., is having preliminary plans prepared for the construction of a 2 story, 154 x 180 ft. repair shop and garage. Estimated cost $200,000. Private plans.

R. I., Providence—American Radiator Works, 216 Aborn St., awarded contract for the construction of a 50 x 200 ft. garage and repair shop. Estimated cost $75,000.

Tex., Port Arthur—Kansas City Southern Railway Co., Southern Blvd., Kansas City, Mo., plans improvements to yard, including construction of new car and locomotive shops, etc. Estimated cost $1,250,000. A. M. Reece, Ch. Engr.

Tex., San Antonio—R. T. Pruitt, 429 East Evergreen St., and E. Lamm, plans the construction of a 3 story, 50 x 80 ft. ramp type garage on Alamo St. between Huston and Travis Sts. Estimated cost $40,000. Adams & Adams, Gibbs Bldg., Archts. and Engrs.

Wis., Madison—French Battery & Carbon Co., 2317 Winnebago St., is receiving bids for the construction of a 2 story, 96 x 117 ft. factory for the manufacture of batteries. Estimated cost $50,000. J. R. and J. Law, First Central Bldg., Archts.

Wis., Milwaukee—Dept. of Public Works, will soon receive bids for the construction of a 120 x 460 ft. central repair plant on 16th St. Estimated cost $150,000. C. E. Malig, City Hall, Archt. Noted Jan. 29.